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BY

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NOTICE TO OUR READERS.

The ARCHIVES OF OPHTHALMOLOGY contain *original papers* on all branches of ophthalmic surgery, and *original reports* on the progress of ophthalmology. The original papers occupy from two thirds to three fourths of the space, and their scope embraces all subjects of scientific and practical interest connected with this department of medicine.

The object of the ARCHIVES is to guard, solidify, extend, and diffuse the stock of acquired ophthalmic knowledge by recording the constant addition of new observations, investigations, methods and means of examination, clinical experience, instruments and remedies, and further by taking part in the discussion of the questions of the day with a spirit alike conservative and progressive.

Particular attention is paid to the preparation of the Report on the Progress of Ophthalmology. The report is intended to furnish a *complete, systematic, and early* review of the current ophthalmological literature of the world. It has been necessary to divide the work of its preparation among a number of collaborators according to the following arrangement :

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1. *General Ophthalmological Literature :*
   - *a.*—Text-books (not abstracts, but notes pointing out what is new and characteristic).
   - *b.*—Monographs and papers on historical, statistical, and general subjects ; reports on societies and hospitals.
   - *c.*—Periodicals on our specialty (short notices of their character, time and place of publication, the titles of the original papers, with the names of their authors).

2. ***General Pathology, Diagnosis, and Therapeutics,*** including new instruments, apparatus, and remedies.
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Dr. A. NIEDEN, of Bochum, Westphalia :

1. *Uveal Tract,* including glaucoma.
2. *Refracting Media,* including the lens.
3. *Retina and Optic Nerve.*
4. *Injuries and Foreign Bodies of these parts.*
5. *Ocular affections in connection with general diseases.*

In order to obtain complete and recent reviews on the non-German ophthalmological literature, special reporters have been selected for different countries, who will send monthly abstracts of all local ophthalmological publications to Dr. C. Horstmann, of Berlin, the editor of the Report. Dr. Horstmann will distribute these abstracts among the German reporters according to the above plan, in order to preserve the systematic arrangement, which we think of paramount importance.

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In the interest of our readers, who are scattered over the whole world—and whom, like ourselves, we desire to keep informed of all advances in ophthalmology,—furthermore in their own interest, authors of ophthalmological works are requested to send reprints, duplicates of journals, or copies for reviewing, to one of the above-named reporters, or to the editors or publishers of the Archives, according to their convenience.

The abstracts of American ophthalmological literature formerly appeared under a special head, but are now embodied in the systematic Report. Text-books may be specially noticed.

The number of good papers offered us for publication has increased to such an extent that it is no longer possible to translate all of them unabridged. Whenever a German paper is condensed in the English version, or *vice versa*, it will be so stated. Should any one of our readers wish to recur to the original, the editors will always take pleasure in sending it for reference.

Under the heading of "Miscellaneous Notes," there will be published all kinds of professional news which specially concern the oculist, *e. g.*, appointments, honors, resignations, vacancies, new ophthalmic hospitals, opportunities for instruction, prize questions and essays, announcement of Society meetings, etc. Brief notices of this kind will be thankfully received by the editors.

Original papers of value from any source will, as heretofore, be welcome to the ARCHIVES, and are solicited.

EDITORS:

H. KNAPP, M.D.,
25 WEST 24TH STREET, NEW YORK.

C. SCHWEIGGER, M.D.
ROONSTR. 6, BERLIN.

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NOTICE TO CONTRIBUTORS.

The editors and publishers of the ARCHIVES beg to offer some suggestions to authors who propose to favor them with their contributions.

1. As original communications the ARCHIVES can accept only such papers as have never been printed nor are intended to be printed in other journals. If a preliminary communication on the subject of a paper has been published, the author is requested to state this in the letter accompanying his manuscript. It is understood that contributors to these ARCHIVES and editors of other periodicals will make no abstracts of the original papers published in this journal without giving it due credit for the same.

2. Authors will receive gratuitously twenty-five reprints of their articles. If a greater number is desired,—notice of which should be given at the head of the manuscript,—only the additional cost of presswork and paper will be charged to the author.

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a. Write on one side of the paper only.

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c. Draw a line along the margin of such paragraphs as should be printed in smaller type—for instance, all that is clinical history in reports of cases, etc.

d. Words to be printed in *italics*, should be underscored once, in SMALL CAPITALS twice, in LARGE CAPITALS three times.

4. Authors may receive proofs for revision if they will kindly return them without delay. We beg however to remind our contributors that changes in the copy are equivalent to resetting, causing so much additional expense. We therefore request them, to make, if possible, no alterations at all in their MSS., or, at least, to limit these to what is of essential importance.

ARCHIVES OF OPHTHALMOLOGY.

REPORT OF ONE HUNDRED CATARACT EXTRACTIONS AT THE PRESBYTERIAN EYE, EAR, AND THROAT CHARITY HOSPITAL.

By E. OLIVER BELT, M.D., Resident Physician.

DURING the past eighteen months considerable attention has been called to the after-treatment of cataract cases by closure of the lids with simple adhesive strips to the exclusion of compresses, bandages, etc. As this mode of dressing, though an old one, is quite a departure from the established customs of the present day, I thought perhaps it would be of interest to hear the result of our experience at the Presbyterian Eye, Ear, and Throat Charity Hospital, where Prof. J. J. Chisolm has given this method a thorough trial. My report embraces only the last one hundred extractions of senile cataracts, though a number of them were complicated with glaucoma, nerve atrophy, and other fundus troubles, which decrease the good results materially.

Most of the operations were performed according to a modification of v. Graefe's linear-extraction method. But in four cases the lens was extracted without iridectomy, and in three the capsule was removed with the lens.

Of the one hundred patients fifty-nine were males and forty-one females; eighty-six white and fourteen colored. In thirty-seven cases both eyes were closed with silk isinglass plaster, and in sixty-three cases one eye was left open.

A large majority of our patients were discharged the fourteenth day after the operation, many of them to go to homes hundreds of miles away. Usually their eyes were

tested the day before their departure, that being our only opportunity of examining them. The degree of vision attained that soon after the operation was by no means as good as they ultimately received. We frequently found in those living near, who had been discharged with V $\frac{20}{c}$, V $\frac{20}{xxx}$ or V $\frac{20}{xl}$ several months later. Accordingly, having to test their vision so soon after the operation, and knowing that it would not be a fair and accurate estimate of the final result, I have not followed the usual classification in tabulating the results, but think the following practically as definite as could be obtained under such circumstances.

In the visual results four divisions are made: (1) Good vision, in which are included all cases getting from V $\frac{20}{xx}$ to V $\frac{20}{cc}$. (2) Improved vision, those which have less than V $\frac{20}{cc}$, but can see to get about and read large print. (3) Vision not improved, those having no more than light perception, owing to closed pupils, fundus troubles, etc. (4) Failures, cases in which the eye was lost or in such condition that no subsequent operation could restore sight.

The majority of the operations were performed by Prof. Chisolm, but quite a number by Dr. Herbert Harlan.

INFLUENCE OF AGE ON THE VISUAL RESULT.

	Good vision.	Vision improved.	Vision unimproved.	Failure.	Total.
Under 50 years of age	9	2	1	1	13
Between 50 and 60 years of age	14	1			15
" 60 " 70 " " "	28	3	1	1	33
" 70 " 80 " " "	27	1	1	2	31
" 80 " 90 " " "	4		1		5
" 90 " 100 " " "	1		1	1	3
Total	83	7	5	5	100

Age seems to have had but little influence upon the result, except in cases accompanied by much debility; in those we sometimes found a tardy closure of the corneal wound.

INFLUENCE OF HAVING ONE OR BOTH EYES CLOSED.

	Good vision.	Vision improved.	Vision unimproved.	Failure.	Total.
Both eyes closed	29	2	2	4	37
One eye closed	54	5	3	1	63
Total	83	7	5	5	100

INFLUENCE OF COMPLICATIONS UPON THE RESULT.

	Good vision.	Vision improved.	Vision unimproved.	Failure.	Total.
Vitreous lost	7		1		8
Capsule removed with lens	2		1		3
Capsular deposit	5	6			11
Other complications	2		1	1	4
Smooth extractions	67	1	2	4	47
Total	83	7	5	5	100

As will be readily perceived, eighty-three per cent. received good sight, and ninety per cent. were benefited.

That we should have had better results in the cases in which one eye only was closed was rather surprising and unlooked for. To have one eye open is of inestimable value as regards the comfort of the patient, enabling him to walk about his room, eat without assistance, and dress and undress himself. These great advantages could have been surmised, but whether the results would be as good was doubtful, and the experiment was made with considerable anxiety.

One case after another was so treated, and the year's work has demonstrated that not only have the discomforts of the patient been reduced to a minimum, but a higher percentage of good results has been attained thereby. With both eyes closed the patient was uneasy and anxious. He could not turn one way or another to wait upon him-

self without the fear of striking his eye or stumbling over articles of furniture. He had to be assisted in taking his food, and in dressing and undressing, and as the days passed slowly by he became more irritable, and in a general condition not conducive to a good result. With one eye open all of this is avoided. He is not in a constant state of fear, but is able to move about his room at pleasure, see and entertain his friends, and keep in good spirits.

INFLUENCE OF COMPLICATIONS UPON THE RESULT.

In eight cases vitreous escaped during the operation; in some before the extraction of the lens, and in others after. However, good vision was obtained in seven cases. In the one case in which vision was not improved, the patient was over ninety years of age, in very feeble health. There was tardy closure of the corneal wound and some kerato-iritis.

There were four extractions without iridectomy, and though good vision was obtained in all, there was some iritis in each with herniæ of the iris in two. Eserin was used in all. In three cases the capsule was removed with the lens, getting good vision in two and vision unimproved in one, owing to choroidal atrophy.

There was sufficient capsular deposit in eleven cases to interfere somewhat with vision, but in five good vision was obtained, and improved vision in six. A second operation would probably result in good vision for these also.

In four cases there were other complications, which resulted with good vision in two, vision not improved in one, and one failure.

Of seventy-four smooth extractions sixty-seven obtained good vision.

Of seventy smooth extractions not complicated by fundus troubles prior to the operation, only three were lost, one by panophthalmitis; giving good vision in 95 per cent.

In seven cases vision was improved, but under $\frac{20}{cc}$. In one of these cases good vision was not obtained owing to glaucoma. In five capsular deposit interfered with good vision, and iritis in one.

Of the five cases not improved, the first was due to intra-

ocular trouble not clearly made out; the second to choroidal atrophy; the third to nerve atrophy; fourth to kerato-iritis, sequel of difficult extraction of lens, with escape of vitreous, patient ninety-one years of age, and in feeble health; fifth due to closed pupil from iritis.

The five failures I give in detail.

1st. Mr. R., ninety-two years of age, feeble health, and nervous. Was very restless during the operation, and much manipulation was required to get the lens out. Both eyes were closed by adhesive strips; suffered nightly from time of operation, and had to have morphia to relieve pain. When the strips were removed the fifth day the pupil was closed with lymph, the result of iritis. Left the hospital the fourteenth day, eye still painful and pupil filled with lymph and blood.

2d. Mrs. A., aged seventy-one. In poor health and deep grief from recent loss of husband; cataract had been forming for years and was over-mature. Operation was smooth, and both eyes were closed with strips; suffered some pain at times for several days, which was relieved by morphia and sodium salicylate internally, and atropia locally. Could see quite well when she left the hospital, but getting wet a few days later, iritis ensued and the eye was lost.

3d. Mr. B., aged thirty-nine. Much emaciated from diabetes mellitus, with which he had been suffering for several years. Three weeks prior had cataract removed from left eye with perfect result. V $\frac{20}{xx}$. Operation on right eye was smooth. Both eyes closed with strips. Eye was lost by kerato-iritis.

4th. Mr. B., sixty-five years of age. Cataract in each eye, mature in the left. Extraction of the lens was under cocaine. Both eyes were closed as usual by strips, which were removed the sixth day; cornea clear and pupil well dilated, under atropia, but the eye was much injected, and masses of lymph seen in vitreous. Eye was destroyed by hyalitis.

5th. Mrs. B., aged seventy-four. In feeble health, cataract in each eye. Lens extraction smooth. Commenced to suffer immediately after the operation, and third day lids began to swell, and the eye was lost by panophthalmitis. A few days before she was operated upon several boys from a reformatory school had been received into the hospital suffering with purulent ophthalmia, with iritic herniæ. Iridectomies were performed on them, and this

case being operated upon about the same time, seemed to be one of contagion.

MODE OF OPERATION AND TREATMENT.

Patients are usually operated upon the day they arrive at the hospital, undergoing no preparatory treatment whatever as to dieting, etc. The operations are performed in a well-lighted operating-room, with the patient upon a table of suitable height and width. I think the table is preferable to a bed, as with the former you can get easily around your patient at the head or on either side, as is necessary and most convenient in the progress of the operation. You are not in a constrained stooping posture, but always have your patient at an agreeable height to which you are accustomed. A 2 % solution of cocaine is instilled into the eye a few minutes before the operation is begun. As soon as anæsthesia is produced, the lid speculum is introduced and the eye flooded with a solution of biniodide of mercury, $\frac{1}{20000}$. The liquid comes in contact with every part of the mucous lining of the eyeball and lids. The corneal section is then made usually large, the iridectomy small. The capsule is opened quite freely, as a rule by a horizontal incision over the upper margin of the lens. The lens is expelled by gentle pressure with the rubber spoon on the lower margin of the cornea. Great care is taken that no cortical substance, or shreds of iris or capsule are left in the corneal wound. The eye is again suffused with the biniodide of mercury solution, and usually a few drops of atropia instilled. The speculum being removed, the lids are gently closed, and a thin piece of silk isinglass plaster one and a half inches long by one inch wide applied. This extends from just under the brow to the cheek, and covers the lids entirely, except a small space at the inner canthus for the escape of secretion and instillation of drops.

The silk isinglass plaster is preferable to the gold-beater's skin, as the latter was frequently torn in two before the eye was in condition to be opened. As soon as the plaster was dry and firmly adherent, the patient, usually with one eye open, walked to his room, sometimes up two flights of

stairs, and was then allowed to sit up or lie upon his bed as he felt disposed. Many of our patients during the entire course of treatment only retired to their beds at night. The rooms are provided with blue window shades to keep out the harsh light. Patients are instructed not to read or use their open eye any more than necessary, especially the first few days. The strip is not removed usually before the fifth day, though in a number of cases it came off the third or fourth day, and was not replaced, the patient not suffering by it. If during this time any mattering of the eye is noticed, a solution of bichloride of mercury, $\frac{1}{4000}$, is used quite freely, dropped in at the inner canthus without removing the strip; also atropia when there is pain. In those of a rheumatic tendency several doses of salicylate of soda are given, which relieves very promptly. Mercury is given when syphilis is suspected.

The window shades are raised by degrees after the strip is removed, and usually by the fourteenth day the patient is not annoyed by full daylight, and is ready to be discharged from the hospital. In a number of cases the adhesive plaster was applied to patients who had had one eye previously operated upon for cataract when compresses and bandages were used. They much preferred the adhesive strip.

I have heard the idea advanced that detachment of the retina was much more apt to occur after extraction of the lens, when the eye was closed by the simple adhesive strip, than when closed by a compress and bandage; and especially in cases in which there was escape of vitreous. This is somewhat plausible, but we have not found a detached retina in any case so treated, and in a number of them vitreous escaped in large quantities. On the other hand, I think the good of the bandage, in preventing lessened tension and consequent retinal detachment, is more than counterbalanced by the harm resulting from pressure on the cornea, displacing the edges of the corneal wound and sometimes forcing a fold of iris through the wound. This will be better understood by quoting from an article by Dr. Chisolm on the "After-Treatment of Cataract

Cases,"[1] in which he says: "The front of the eye is the prominent part of an elastic ball. When pressure is made upon it, the prominence must be pressed in, and the equator of the ball necessarily bulged out. When the eye has been cut open near the line of the equator, as in corneal section for cataract, any pressure upon the eyeball by a well secured compress must tend to displace the base line, and disturb the nice adjustment of the lips of the corneal incision, which the closed lids had effected." This would necessarily cause a more tardy closure of the corneal wound, and a greater tendency to iritis. The adhesive strip acting as a splint to the lids, with equal pressure at every point, is a perfect support, and tends to keep the lips of the wound in perfect apposition, without displacing the iris, or forcing shreds of capsule into the wound.

USE OF ANTISEPTICS.

As previously stated, the eye is thoroughly washed with the biniodide of mercury solution when the operation is performed, and afterwards, upon the slightest indication of trouble, the solution of bichloride of mercury, $\frac{1}{4000}$, is used very freely. This solution is prepared from compressed tablets made by J. Wyeth & Bro., which contain about equal quantities of mercury and muriate of ammonia. I have not found this irritating or harmful in any way, and am persuaded that the free use of these antiseptics has contributed not a little to the good results obtained.

In looking over a number of reports of cataract extractions I have found a large number of failures due to sloughing of the cornea, yet during a residence of about eighteen months in this institution I have seen only one case of corneal sloughing follow cataract extraction, and that one was the case of panophthalmitis previously referred to which was clearly traceable to infection.

[1] Read in the Section on Ophthalmology, Otology, and Laryngology, at the thirty-eighth annual meeting of the American Medical Association.

CASE OF DIFFUSE HYPEROSTOSIS OF THE GREATER WING OF THE SPHENOID — RIGHT SIDE.

By WILLIAM F. SMITH, Chicago, Ill.

Mrs. Captain H., of this city, called on me for professional advice March 10th of this year. The lady is forty-four years old, well nourished, of medium height, and the mother of nine children, two of whom are dead from natural causes, the others perfectly healthy.

She complained that her right eye was constantly weeping; that the weeping was much more noticeable at her menstrual periods, and that the lids of this eye appeared puffy and swollen at such times. She wore glasses (Formula: 180° —0.50 —0.50. ——— 175° —0.75 —0.50.), which had been prescribed for her at a previous consultation, and with which her acuteness of vision had remained normal. She did not, at that time, complain of double images, nor was there any apparent displacement of either eye. The ophthalmoscope revealed nothing abnormal in the fundus of either.

I slit the upper canaliculus with Bowman's probe-pointed knife, and syringed the lachrymal passages with a solution of bichloride, 1 to 4,000. This was repeated several times, when the epiphora disappeared, and the patient discontinued her visits. I noticed at this time a prominence of the right side of the face, but thought it an individual peculiarity, and there was certainly no marked exophthalmus.

October 13th.—She again presented herself, in company with her husband. She stated that a few weeks after her last visit she had noticed a slight diminution of the vision of the right eye. At the same time the swelling, she had before remarked only at her menstrual periods, had become permanent, and had increased

slowly, but constantly, ever since. The vision also had continued to fail, till now she could hardly tell the difference between night and day with that eye. Tears flowed constantly. She had said very little to her family about her failure of sight, dreading something serious, which she feared would be revealed by professional examination.

Objectively there was exophthalmus, with a bulging outwards and forwards of the whole temporal region of the right side. The ocular bulb was displaced forwards and towards the median line. When looking in the distance (eyes in the primary position) the right pupil was 25 *mm* from the centre of the crest of the nose. The left pupil was 30 *mm* from the crest, showing the displacement of the right eye to be 5 *mm* toward the median line. The distance from the crest of the nose to the extreme boundary of the right temperal region was 70 *mm;* measured to the left on the same line, it was 60 *mm.* Placing the end of a small ivory rule against the aural helix, just above the tragus, and noting the distance to the summit of the cornea on either side, it was found to be 20 *mm* greater on the right than on the left. There was no displacement upwards or downwards.

A tumor evidently existed involving the outer wall of the right orbit. On questioning the lady and her husband as to the possible causes, I was able, definitely, to exclude any syphilitic taint. The patient had one miscarriage, but it occurred at the second month by injury and fright. She finally called to mind the fact that when she was a child, five years of age, she had been gored by a cow, and thrown several yards. The horn had penetrated somewhere near the right eye, and after that she had been cross-eyed for some months. The effect, however, had disappeared, and she had almost forgotten the circumstance.

As the sequel shows, the end of the horn must have penetrated the right orbit, reaching the orbital surface of the greater wing of the sphenoid.

Ophthalmoscopic examination of the right eye showed complete atrophy of the disk. The veins were narrow, and the arteries hardly visible. There was no swelling of the disk; this is in strong contrast with the condition so often described in conjunction with tumors of the brain. The rest of the fundus was entirely normal, and the media were clear. The atrophy was due to strangulation of the optic nerve trunk at the optic foramen. This fact should have suggested the possibility of a bony growth,

but it did not strike me at the time. The fundus of the left eye presented no deviation from the normal condition. The visual power was still perfect with the glass prescribed nearly two years before.

Before deciding on a diagnosis, I concluded to call Dr. Fenger of this city in consultation. The Doctor was kind enough to meet the patient with me the next day. At a point about halfway between the external canthus and the lower body of the external rectus, we passed an exploration needle (after having brought it to a red heat in a gas flame to sterilize it) deeply into the orbit in the direction of the optic foramen. A few drops of bloody serum were obtained, which gave only a negative result under the microscope. A single group of small, spindle-shaped cells were seen, but not enough upon which to found a diagnosis. After careful consideration, an operation for the removal of the growth was proposed, and acceded to.

The operation was performed at the *Emergency Hospital* on the 20th of October.

Thorough antiseptic precautions were carried out as to the person of the patient, the surgeons and assistants, the operating-room, and the instruments employed. Dr. Fenger conducted the details of the operation. We were ably assisted by Dr. Holmboe and Mr. Schwan. The right side of the head and eyebrow were shaved.

An incision, including the periosteum, was made from the external angular process of the frontal bone, downwards along the border of the orbit, across the malar bone, curving backwards beneath the malar process of the superior maxillary. The periosteum was separated from the bone of the outer wall of the orbit as far towards the apex as possible; when a solid mass of bone could be felt projecting apparently from the orbital surface of the sphenoid. A chisel was used to separate the external angular process of the frontal from the frontal process of the malar bone. A strong curved needle, carrying a chain-saw, was passed through the spheno-maxillary fissure from above downwards and around the malar process of the superior maxillary, bringing it out just above the canine fossa. The malar process was sawed away. The upper end of the incision was now extended backward from the superciliary ridge, and the flap thus formed, including the malar bone, was lifted out by breaking the zygoma. The bulb of the eye was amputated just behind the

conjunctival ring; the optic nerve was divided close to the optic foramen, and the entire contents of the orbit evacuated, leaving the cornea and conjunctiva *in situ*. This was done to prevent the subsequent ingress of microbes. The osseous tumor was now seen to occupy nearly one half of the orbital space, and to extend downwards and outwards, and towards the median line. Its entire extent could not be well determined. On using the chisel and mallet it was found that it could be readily removed in chips and shavings. It was evidently not of the eburnated variety; neither was it spongy in structure. It seemed simply a thickening or hypertrophy of true bone. It was cancellated; but there were no medullary canals of any considerable extent. In the immediate track of the chisel, white bone surface could be seen, dotted rather sparsely with small red spots—the Haversian canals, and openings of blood-vessels. The bone was chiselled away as deeply and extensively as was deemed prudent. The extent excavated was about 2 inches in a vertical direction, about 2 inches at its widest part, and about ¾ inch deep. A drainage tube was left in the orbit. It passed downwards through the lower extremity of the wound and beneath the malar bone. The separated parts were readjusted in their proper positions, the cut and broken osseous surfaces were united with sutures of chrom-catgut, and the external wound coapted by sutures. A very thorough antiseptic dressing was made to invest the entire side of the head.

The wound healed *per primam intentionen*. Some serum and coagulated blood were found in the wound—rather, drainage tube—on the third day, which was easily dislodged and washed away by irrigation with a solution of bichloride, 1 to 4,000. Not a particle of pus was seen. The stitches were removed the eighth day. The patient left the hospital November 24th.

November 27th.—She experienced violent pain in the region of the growth for some hours. During the night following menstruation appeared, upon which the headache immediately left her. The flow was normal.

December 4th—Careful examination showed that the wound had healed completely. The mucous membranes of the eyelids are intact, and it is possible that an artificial eye may be adjusted later, after a fashion. Very little secretion appears on the mucous surface, as the tear-glands were removed. By palpation of the lids the bottom of the orbit cannot be reached, and the bony surface of the tumor cannot be touched. All the measure-

ments possible to be made from the crest of the nose and the root of the aural helix show the two sides to be entirely symmetrical. The movements of the jaw are somewhat interfered with, though she can masticate her food without difficulty, and the movement is easier than a week ago. There has been considerable dizziness since the operation, which has not entirely ceased.

Dr. Fenger made the following remarks in regard to the case:

"Among the osseous tumors of the orbit, this seems to be a very rare case. The osteomas from the accessory cavities of the nose give by far the greatest contingent to the osseous tumors of the orbit, inasmuch as, out of fifty-seven such tumors collected by Bornhaupt, fifty were osteomas from the cavities mentioned, and secondarily invaded the orbit, while only seven were osseous tumors developed in the wall of the orbit proper. To the latter class, of course, belongs the case here mentioned, but differs from them in many respects, inasmuch as those external exostoses, as Bornhaupt calls them, are usually limited (more or less locally prominent tumors), often with an uneven, nodulated surface, of slow growth; while this was more a diffuse hyperostosis of the whole of the greater wing of the sphenoid and had an even surface. It can hardly be classed among the exostoses; it belongs rather to the diffuse hypertrophies which, when affecting all the bones of the cranium and face, produce the so-called *leontiasis ossea* of Virchow; but in this case it seems limited to the one half of the spenoid bone."

On looking up the literature of the subject of osseous tumors of the orbit, I find some very interesting details. Berlin, in the "Graefe-Saemisch Handbuch," vol. vi., p. 725, 1880, refers to sixty-eight cases reported since 1750. He divides them into three classes; the cellular, partly cartilaginous, and ivory hard. Sixty per cent. form in the roof or upper margin of the orbit; twenty per cent. in the inner wall, and twelve per cent. on the floor of this cavity. All of these may have originated in the contiguous cavities, excepting only one, which invaded the outer wall, and was an exostosis, having its origin on the squamous portion of

the temporal bone. In only four of these cases could the tumor be ascribed to the influence of wounds. These include Knapp's interesting report of four cases, read at the International Congress at New York, 1876.

Dr. Bornhaupt, of St. Petersburg, in an article in Langenbeck's *Archiv. f. Chirurgie*, vol. xxvi., p. 589, has collected the reports of fifty-seven cases of osseous tumors of the orbit, which were referred to by Dr. Fenger as above. Of these he has classified seven as "external exostoses." It is doubtful whether all of these properly belong to this classification. At least two of them seem to simulate very closely the case which is the subject of this article. As for the others, it is impossible to say, from the reports, whether they were encapsulated osteomas or not. For purposes of comparison, they are transcribed below; also a few other cases of hyperostosis of the bones of the skull which were reported in detail by an older authority.

24. A servant girl, aged twenty or thirty years, had a tumor of bone which appeared at the upper inner angle of the right orbit. It was the size of a hazel-nut, had been growing slowly during seven months. It displaced the eye downwards and forwards. Canton removed it with a small chisel, and found that it was of ivory hardness on its exterior, but spongy in its internal structure. Recovery followed.

(This history is very indefinite. From the character of the tumor, however, it is probable that it grew from the frontal sinus, and was a true osteoma—not an exostosis.)

25. Two months after a fall from a ladder, in childhood, a tumor formed on the upper margin of the orbit, which appears now upon the patient (a driver forty years old) as a conspicuous, uneven growth of ivory hardness, causing the right orbital margin to project one inch beyond the left. The eyeball is pressed down and forwards; the visual power almost gone. Haynes Walton sawed the tumor away. With the healing of the wound the visual power was completely restored.

(This was a true hyperostosis of traumatic origin.)

26. A seventeen-year-old girl received a blow by a rake, the handle of which entered the orbit. A year and a half later, after the wound had long healed, a broad-based, bony tumor developed

in the upper margin of the orbit, dislocating the bulbus downwards and inwards. Four years after the accident Salzer, after several sittings, removed it in pieces. He first used the chisel and mallet; then the trephine, which he applied six times. The tumor weighed 59.7 *grm.* The wound healed and the eye regained its sight.

The 27th case, classed here, is too indefinite for consideration.

28. Windsor chiselled a bony tumor from the upper and lateral margin of the orbit of a twenty-four-year-old weaver girl, which had developed in fifteen months, and had thrown out a process under the upper orbital margin, and had displaced the eye downwards and forwards. It consisted partly of bone and partly of cartilage (?). Recovery followed.

29. Stephenson sawed from the upper orbital margin of an eighteen-year-old girl a bony growth which looked like an inverted cone. It had developed in three years. A good result followed.

30. Mackenzie attempted to saw from the upper orbital margin of a workman a projecting, sharply defined exostosis. It was the size of a dove's egg, and pressed the eye downwards and forwards. He desisted on account of its hardness, and contented himself with sawing out a wedge-shaped piece. Ten years after the operation the tumor still remained. It lay in the wound, "open to the day." The space from which the wedge-shaped piece had been sawed, three fourths of an inch deep, was unchanged, and appeared as if only lately done.

Of the six cases here transcribed, the third (Bornhaupt's Case 28) is so carelessly reported that the character of the tumor can hardly be conjectured. The author says it developed in the lateral margin of the orbit; yet it "displaced the eye downwards and forwards." The details are so meagre that it cannot be classified. Of the five remaining, two were evidently of traumatic origin. Of the three others any statement as to this important detail has been omitted.

Bornhaupt gives the reports of forty-nine other cases of tumor of the orbit, which had their origin in the neighboring cavities, viz.: twenty-three cases of osteoma from the frontal sinus; eleven cases from the ethmoid labyrinths; ten from the antrum Highmori, and five from

the cavities of the sphenoid. When the reports are given with any thing like attention to details, a mucous membrane is always mentioned as covering the tumor; this membrane invested the tumor closely; it did not bridge the furrows, but extended into them, adhering to the bony surface everywhere, and at least the cortical portion of the tumor was always ivory hard. These three points, or characteristics, viz.: (1st) the origin of the tumor from one of the bony cavities, (2d) the encapsulating membrane, and (3d) the ivory hardness, should serve to distinguish the "encapsulated osteomas" from the "exostoses" and "hyperostoses." The osteomas rarely, if ever, have a traumatic origin; the exostoses and hyperostoses nearly always have, and are developed from the periosteum.

In the case of [Mrs. H. the tumor, without doubt, developed from the periosteum, but it differs from the osteomas in that it was not ivory hard, it was not enveloped by mucous membrane, and it did not have even a remote connection with any sinus. It was also of traumatic origin. Cases 25 and 26 of the collection of Bornhaupt have all these characteristics in common with it. I have found other analagous cases in the "Handbuch der Praktische Chirurgie," von Dr. Victor Bruns, 1854, p. 533, as follows:

Oesterlen (*Würtemberg. medicin. Correspondenzblatt.*, Stuttgart, 1832, p. 79). A thirty-one-year-old healthy vineyard worker, in felling a tree, received a blow from a beam on the right frontal protuberance, which caused great pain and dizziness, some ecchymosis, but no open wound, so that in half an hour he was able to resume his labors. Shortly afterwards he felt continual burning at this spot, which was increased by bodily exertion. Half a year afterwards an elevation the size of a bean was discovered, which, little by little, increased in height and breadth, so that in twelve years it had reached the size and form of half a goose egg, and in sixteen years the size of two small fists laid side by side, but without any increase of the burning or other casualty. Its circumference was 13½ inches, and its vertical diameter 7½ inches. It included the greater part of the forehead, leaving only the left side free, extended with a sharp boundary to the

coronal suture and to the suture of the temporal bone, while its forward, sloping margin extended to the upper edge of the orbit. At the point of its greatest projection it felt like stiff dough. According to information by letter, this patient died, at the age of seventy-six years, from an inflammation of the lungs, without having suffered any diminution of his mental or bodily powers by reason of the tumor, and in spite of the fact that it had continued to increase in all its dimensions. At the section was found, under the unchanged cuticle and at the summit of the tumor, a layer of thickened cellular tissue about one inch deep. The frontal bone proper was plainly recognized, the inner and outer tables of which, as well as the sclerosed diploë, were covered in by the thickened bony formation, which, for the most part, was very compact, but contained numerous canals for vessels, and in which was seen one spot of spongy tissue. A thin, uneven layer of bony, new formation was found on the inner surface, which was also very compact, with the exception of one spot.

Page 536 (v. i.). Himly (de exostosi cranii rariore. Diss. Göttingæ, 1832). Franz H., æt. twenty-four, cobbler, was received in the University Hospital Nov., 1828, for a loss of vision of the left eye, and a loss of hearing of the left ear, from which he had suffered for some years without any visible cause. Notwithstanding, he travelled as a journeyman, had become infected, and had undergone treatment by mercury. After recovery a swelling appeared in the left temporal region, accompanied by dull pain, while, at the same time, the sight and hearing of the right side began to diminish. This constrained him to seek medical advice in Gottingen. The swelling, or tumor, was attached to the bone, was hard, painless, and immovable. The patient was otherwise healthy, lively, and talkative, though complaining of headache from time to time. Little by little cheerfulness, sight, hearing, and his capability of conducting himself diminished, so that finally he seldom left his bed. By the end of September the tumor seemed to reach its greatest size, and then appeared to come to a stand-still. The pupils became entirely immovable; hearing nil; consciousness still persists; speaks in a stuttering manner; headache continuous; once in a while there is great irritability and mania; appetite unnaturally large; almost constant sleep; great satyriasis; finally death in 1831.

The section showed that the tumor was connected with the left parietal bone, from which it passed over on to the contiguous

bones. Its external surface contained many depressions and nodules, as well as openings for the entrance and exit of blood-vessels. It reached deeply into the cavity of the skull. The A. meningea media ran in a deep furrow on its inner surface. Upon sawing through it, the outer and inner tables of the skull, with the diploë, were easily recognized, and were perfectly healthy. The outer part of the tumor was more cellular, in the middle, and surrounded externally by a cortical layer several lines in thickness. The inner part contains larger cells, and its cortex is only $\frac{1}{2}$ a line thick. The entire thickness of the tumor was 2 inches 8–10 lines; of which 1 inch 10–11 lines belonged to the outer part; 2–3 lines to the bones of the skull and diploë; while 6–8 lines comprised the inner part of the tumor. In addition to this there lay in the fossa anterior sinistra of the left side of the occipital bone, and between the cerebellum, medulla oblongata, pons Varolii, and the posterior lobe of the cerebrum, a medullary sarcoma of the form and size of a hen's egg, which had no connection with the neighboring parts, excepting with the N. trigeminus, facialis, auditorius, and some blood-vessels which passed with the pia mater into the greater and lesser lobes of the brain.

Page 537 (v. i.). Rognetta (*Revue médicale de Paris*, 1835, p. 706). A twenty-year-old Englishman, two and a half years before, had received a blow of the fist on his right temporal bone while boxing. Upon this spot there arose a tumor of bony hardness, which grew gradually without pain, has a broad base beginning about half an inch from the outer right eyebrow, extending two inches backwards and upwards, and has now attained the size and form of an egg. Patient had never had syphilis. Numerous leeches, in all about six hundred, were applied to it without any result. Afterward a salve of muriate of ammonia and mercury (10 to 1) was rubbed on it for ten minutes morning and evening, and continuous compression was effected by an apparatus so constructed that it could be worn under a wig. After fourteen days of this treatment the tumor was reduced one half. (Further history of the case is not given.)

Page 538 (v. i.). A married woman, thirty-two years old, a midwife, perfectly healthy, has remarked for some years a tumor in the middle of her forehead, which has grown gradually and without pain. At present the tumor has reached the height of about three fourths of an inch, and has a broad base one and a quarter inches in diameter. It is covered with the normal, movable scalp,

is hard as bone, and without well defined borders extends toward the neighboring bones. Patient is very anxious to have it removed for a number of reasons. Operation : A vertical incision in the middle line of the forehead from the root of the nose backwards ; separation of the lips of the wound, and the use of the saw from either side towards the centre. The tumor was removed with very little bleeding. The wound was closed, and healed *per primam intentionem*, excepting the lower end over the root of the nose, which secreted some pus, but healed within ten days without throwing out any pieces of necrosed bone. The piece removed is a compact mass of bone throughout.

(This tumor was not eburneous, otherwise the saw would not have had such ready effect upon it.)

Page 539 (v. i.). Emmert ("Lehrbuch der Chirurgie," Bd. II., p. 65, Stutt., 1851). A twenty-two-year-old, strongly built countryman received a blow from the edge of a shovel six years ago. It was on the right side of his forehead, and after the exfoliation of several pieces of bone the wound healed. But after the cicatrization the patient still seemed to be in very unfortunate condition. He suffered from continuous headache of varying severity, frequently recurring vertigo, loss of memory, and fell into a state of melancholy. All possible internal and external remedies, setons in the neck, etc., were used without benefit. The brain difficulty became more marked, so that the patient rarely left his bed at last. The upright position produced vertigo, and a falling to the left. On examination Emmert found the cicatrix confined to the right protuberance of the frontal bones, where was a bony tumor only slightly elevated. He reflected therefore on the possibility of an enostosis existing at this spot, which, on account of the absence of symptoms of brain abscess (?), would account for the headache, and proposed to remove the cicatrized part with the trephine. This was acceded to and the operation undertaken the following day. A piece of bone one inch in diameter, including the tumor and cicatrix, was removed. The dura mater was uninjured and normal in appearance. The trephined piece of bone was of unusual thickness, and presented, on its inner surface, about opposite to the tumor outside, a spicula of bone, perpendicular to its surface, two by four lines at its base, and eight lines long. The diploë at this point had, for the most part, disappeared, and the membrane was sclerosed. Since the

bony margin in the opening in the skull was at no point unusually thick, Emmert considered the object of the operation attained, and placed a simple bandage in position. Soon after the operation the headache disappeared, and in the course of the healing of the wound the other annoying symptoms vanished. In six weeks cicatrization was complete, and the previous good health was regained.

Of these twelve cases, including that of Mrs. H., six are known positively to have had a traumatic origin. In the other six the details are so meagre that we are not justified in saying that they too had not developed from injury to bone or periosteum.

Of the forty-nine cases collected by Dr. Bornhaupt, evidence of traumatic origin is adduced in only four encapsulated osteomas, and in these the wounds received may have been only coincidences, with a pre-existing tendency, if not the actual presence, of the tumor.

Osseous tumors of the orbit, therefore, naturally divide themselves into two classes by the following points of difference :

Exostoses and hyperostoses originate from injury of periosteum or bone.	Encapsulated osteomas have a fœtal origin and appear with the development of the bone cavities or sinuses, not later than the thirtieth year.
Are covered with periosteum.	Are encapsulated by mucous membrane.
Have the consistency and histological characteristics of true bone.	Are composed of bone as hard as ivory (eburnea ossa).

These well defined characteristics seem to make the two classes of orbital tumors sufficiently distinct, and also to call for some reason why this distinction should be so well marked. The nasal cavities proper are lined with mucous membrane, though there is, no doubt, a connective tissue (periosteum?) between the mucous membrane and the bone surfaces. As the cavities in the bone develop by absorption, we could hardly expect to find true periosteal membrane lining them; though the mucous membrane extends into every part.

While Dr. Bornhaupt argues that the encapsulated tumors, in common with the exostoses, develop from periosteum, he seems to show almost conclusively that the osteomas have a fœtal origin; and in discussing the embryology of the cavities contiguous to the nose he quotes Kölliker as follows: "At first the mucous membrane of the nose folds itself outwards along with one of the cartilaginous side plates covering it, and only gradually comes in contact with the neigboring bone through absorption of the cartilage that envelops it. By further development cavities appear in the bone itself, always lined by the ever-growing folds of mucous membrane." Nothing is said here of periosteum. The cavities in question are developed only after fœtal life, sometimes later than puberty. Dr. Fenger presupposes a periosteal lining, and suggested that "they may develop so that here and there on the periosteum of the cavity is left an embryonal matrix, which may become the point of origin for the encapsulated osteoma."

In none of the records we have seen, however, is it claimed that true periosteum enveloped a bony tumor of ivory hardness. Knapp, in one of his cases, had the composition of the tumor analyzed and found that it very closely resembled true bone; but not any closer than does the composition of the teeth. The teeth are developed from the mucous membrane. Why may not the mucous membrane here, and its underlying connective tissue, by some process of perverted development, be the origin of the encapsulated osteoma?

If this could be admitted, it would enable us to make a still more perfect distinction between those two classes of osseous tumors: those developing from wounded or irritated periosteum, and occurring at any time of life; and those of fœtal origin, developed from mucous membrane with the development of the bone-cavities. The first class belongs to that of exostoses and hyperostoses in general, their position only preventing their removal by ordinary surgical procedure; the second class as easily recognized, but only to be successfully removed when the point of origin of the tumor is made accessible by chiselling away the walls of the cavity till its base can be reached.

CURE OF A DIVERGENT STRABISMUS BY ADVANCEMENT OF THE PLICA SEMILUNARIS TWO DAYS AFTER AN UNSUCCESSFUL PULLEY OPERATION.

By GRANT CULLIMORE, M.D., Atchison, Kansas.

LIEBREICH, in vol. i. of the ARCHIVES OF OPHTHALMOLOGY AND OTOLOGY, maintains that "the caruncle together with the plica semilunaris rests on a ligament which passes from Tenon's capsule to the edge of the orbit." This being true, the annular attachment of the capsule with the belly of the muscle affords a direct connection between the internal rectus and the plica, which furnishes a check to complete loss of the muscle after section, although the lateral attachments may be thoroughly divided.

On the basis of this supposition, Liebreich so modified his tenotomies as to completely separate the plica from the capsule.

An accident which recently happened in the course of an attempted advancement of the internal rectus stimulated me to a practical test of the truth of Liebreich's assertion.

David S. Coburn, aged forty, had since childhood an external deviation of both eyes, most extreme in the right eye, and not so marked in the left eye. The balance of power, however, in the latter eye was considerably in favor of the external rectus. V in R E $= \frac{5}{50}$; V in L E $= \frac{5}{10}$. As a matter of cosmetics, it was decided to operate, and upon section of the external rectus very little correction following, an advancement of the right internal rectus was made.

In the *St. Louis Medical and Surgical Journal*, in Noyes' "Diseases of the Eye," and in the *Ophthalmic Review* for Sept., 1887, there appears an account of Dr. A. E. Prince's "pulley modification" of advancement. Having many times been witness to the success of this method in the hands of Dr. Prince, and having successfully practised it myself, I employed the procedure in this case. A little over-correction was accomplished, so as to compensate for future retraction during cicatrization. The circumstances of the patient were such that confinement of both eyes with the bandage was impracticable, and, besides, I had great confidence in the permanency of my sutures.

The patient returned for inspection the next day, and although the over-correction had disappeared sooner than was desirable, no absolute deviation existed. From the appearance of the parts, however, I had some apprehension as to the result, but allowed the patient to go home and return the next day. To my chagrin, when he returned again, the deviation of the right eye existed quite as extreme as originally. The fault seemed to have been in the application of the "pulley loop." I had not gone deep enough, as Dr. Prince recommends, into the scleral tissue. Here were the possibilities of disgrace before me, and a considerable amount of inflammation and chemosis forbade the reopening of the wound for an attempt to pick up the lost muscle.

Recalling to mind Liebreich's idea, I determined to make the best use of it and advance the plica semilunaris. This I did with a very wide loop suture passed through this tissue with a Tiemann's No. 25 eye needle. The needles, one attached to each end of the thread, were brought out at the upper and lower edges of the cornea, through scleral tissue, considerably internal to a vertical line drawn through the corneal centre. The ends were then tied in a firm knot. Necessarily a great amount of chemosed tissue was puckered at the internal angle from the involvement of so much conjunctival tissue in the suture. But that a conjunctival suture independent of a tendinous attachment such as Liebreich describes could effect a correction, I do not think probable. Of course, there is a continuity of tissue which necessitates traction when a certain tissue area is puckered by a suture, but such traction is not permanent in elastic and loose tissue such as the conjunctiva.

I have no anatomical researches upon which to base my agreement with Liebreich, but the fact that in my case the

eye was brought to a position of parallelism by a comparatively superficial suture through the plica, and at the present time—though some months have elapsed—remains so, is certainly good evidence that in my advancement of the plica the muscle itself was brought forward by its connection, through somewhat dense and inelastic tissue, with the semilunar fold.

The effect of the operation, so far as the appearance of the tissue is concerned, is that of a slightly puckered condition of the conjunctiva at the location of the suture. The caruncle is not much displaced forward, and the sunken appearance which sometimes occurs after strabotomies is not present.

A CASE OF DEATH FROM MENINGITIS, THE RESULT OF PANOPHTHALMITIS FOLLOWING A CATARACT EXTRACTION, WITH REMARKS.

By DAVID WEBSTER, M.D., of New York.*

THE operation of cataract extraction is generally considered as involving very little danger to the life of the patient.

The latter is informed that there are several chances out of every hundred that the operation may fail to restore useful vision, and that it may result in the loss of what sight still remains to the eye, and possibly even in the loss of his eyeball, but when he asks whether in submitting to the operation he runs any risk of losing his life, we feel at liberty to assure him that although no operation upon any part of the body is entirely without risk, yet the risk of death from cataract extraction is so small that it is scarcely worth taking into account.

This view I still hold to be the correct one, notwithstanding the fatal result in the unique case I have to report.

Cataract extractions have always been liable to be followed by panophthalmitis, but this form of inflammation, though very painful and always resulting in atrophy of the eyeball, is rarely, if ever, in and of itself fatal. It is true that death has been caused by meningitis following enucleation of eyes while affected with panophthalmitis.

Noyes, in speaking of the treatment of panophthalmitis, says: "Enucleation is sometimes practised, but it is at-

* Read before the N. Y. State Med. Society, Feb. 7, 1888.

tended with profuse bleeding, unusual reaction, and some degree of danger; a few fatal cases having been reported."

De Wecker, treating of the same subject, says:

"Unfortunately there are cases on record where, after enucleation, the sheath of the optic nerve has been invaded by pus, and where fatal meningitis has quickly supervened."

Mittendorf tells us:

"The greatest charity to the patient would be an enucleation of the eye as early as the disease is recognized, but not after pus has been formed. At this time it is not without danger, as the disease has extended to the meninges in some cases after an enucleation of the eye; this is probably due to the opening of the subvaginal space of the nerve-sheath, which will give an easy access of the purulent matter to the brain."

But I do not find any intimation that the purulent matter may be carried to the brain and a fatal meningitis set up *without* enucleation or any other operation upon the eye affected with panophthalmitis. But this is what must have happened to my patient. He was seen by a member of the staff of the Neurological Department of the hospital, who confirmed the diagnosis of meningitis.

Upon reviewing the case I fail to see how the unfortunate termination could have been prevented.

We do not expect our cataract patients to lose their mental balance, and, removing the dressings, open the recently wounded eye. We do not have them closely watched, day and night, even in private practice. I have little doubt that the exposure of the eye, together with the violence done to it by the patient in removing the dressings, caused the inflammation which resulted in his death, although a certain amount of mental aberration preceded the panophthalmitis.

The case is as follows:

Thomas D., farmer, aged seventy-six, presented himself at the clinic at the Manhattan Eye and Ear Hospital Oct. 28, 1885.

He had lost the sight of his right eye nine years previously from an injury. It was, when we first saw him, in a condition of glaucoma absolutum, having a "ground-glass" cornea, increased ten-

sion, and enlarged and "cork-screwy" emergent ciliary blood-vessels. The sight of the left eye had been failing a long while, and more rapidly during the past year. It was the subject of old corneal opacities and immature cataract.

Dr. C. R. Agnew, under whose care the patient placed himself, advised enucleation of the blind eye as a prudent preliminary procedure to the extraction of the cataract from the left.

This operation he performed, with the patient's consent, on Jan. 29, 1886. The patient recovered from this operation without any unfavorable symptom, and returned to his home at the end of sixteen days.

He returned to the hospital for extraction of the cataract, which had become sufficiently ripe, on February 16, 1887.

Dr. Agnew being absent the writer performed the operation. A drop of a solution of eserine was instilled into the eye one hour, and a drop of a 4 % solution of cocaine twenty, ten, and two minutes, before the operation.

The eye was washed with a solution of hydrarg. bichlorid., 1 to 25,000, before and at intervals during the operation.

The lens was extracted through an upward section with iridectomy.

The patient had very little control over the eye, but the cataract was extracted without loss of vitreous or other accident, Dr. George F. Carey assisting by coaxing out the lens with a cystitome.

After the completion of the operation there was collapse of the cornea, the whole of its area forming a concavity, there being an utter lack of resiliency of the eye-walls.

The lens was very dark, and, perhaps, would come under the head of "black cataract."

The eyeballs were greased with white vaseline, a pad of absorbent cotton applied, over this a flannel bandage, and over all the black silk dressing.

When I called to see him two days later I found him with the dressings removed, he having torn them off himself during the afternoon, or since last seen by the nurse. The patient seemed demented and did not remember having removed the dressings.

As the eyelids were neither red nor swollen, and as there was no secretion presenting between them, I thought best not to open the eye. I therefore applied a fresh pad of cotton and tied on the black silk dressing without a roller bandage.

Feb. 19*th.*—The dressings were removed by the patient twice during the night and once to-day. Still there are no unfavorable symptoms in the eye, but the patient seems to wander in his mind.

Feb. 20*th.*—On removal of the dressings the eye was found to be watering profusely, and in raising the upper lid, with some difficulty on account of the sensitiveness of the eye and the involuntary resistance of the patient, considerable chemosis was disclosed.

Iced cloths were now applied to the eye, two leeches were applied to the temple, and twenty grains of calomel were administered, to be followed by a saline cathartic in the morning if necessary.

Feb. 22*d.*—Iced cloths continued ; patient has no appetite, and is very feeble. The calomel moved his bowels gently without the use of any saline cathartic.

Feb. 23*d.*—The eye to be bathed with hot water for five minutes every hour. The patient to be fed with milk and milk-punches.

Feb. 24*th.*—The condition of panophthalmitis has fully developed itself. The eye to be sprayed several times daily with sol. hyd. bichlor., 1 to 5,000. Patient sat up some to-day.

Feb. 28*th.*—Inflammation unabated, urine passed unconsciously in bed, patient vomited and took but little nourishment. Kumyss and milk-punch continued.

March 2*d.*—Flaxseed poultices applied to the eye. No change in patient's condition except for the worse ; a very little albumen found in his urine. Temperature 99.4°.

March 3*d.*—Temperature 97.8°.

March 4*th.*—Temperature 100.5°.

Patient became comatose at 4 P.M. yesterday and remained in this condition until death, which took place March 6th, at 3 A.M.

It will be remarked that the patient developed a condition akin to dementia on the second day, chemosis on the fourth day, well marked panophthalmitis on the eighth day, vomiting with loss of power over his sphincters on the twelfth day, and died on the twentieth day after the operation. No autopsy was permitted.

A CASE OF SARCOMA OF THE CHOROID WITH METASTATIC INFILTRATION OF THE OPTIC NERVE.

By DAVID WEBSTER, M.D., and IRA VAN GIESON, M.D., New York.

(*With four figures.*)

CLINICAL HISTORY AND OPERATION BY DAVID WEBSTER, M.D.

The patient, a maried woman, thirty-four years of age, was brought to me by my friend, Dr. C. O. Sahler, of Kyserike, New York, on February 10, 1886. Her right eye was normal, with vision twenty-twentieths, and emmetropic. She said that about five years ago, at times, when she was looking steadily at any object, sparks like fire-flies would appear before the left eye, and not before the right. In April, 1884, she first observed that the vision of the left eye was impaired, and from that time the impairment of vision steadily increased, so that the eye became blind by degrees. Dr. Sahler, being called in, discovered a "lump" about the size of a split-pea growing from the supero-nasal portion of the ciliary region. Some time after that he saw her again, when he found that a second lump had developed adjacent and similar to the first. These two lumps soon merged into one, which has steadily increased in size. There is now a staphylomatous-looking bulging, nearly as large as an eyeball, occupying the supero-nasal, ciliary, and scleral regions, with a second smaller bulging back nearly to the equator of the eyeball in the vertical meridian. The lens is opaque.

There was no pain in or about the eye until about the latter part of December, 1885, and since then the pain has been so moderate as not to demand an anodyne. A sharp pain darts

through the eye when the patient is looking steadily at any thing with her right eye.

I made a diagnosis of probable sarcoma of the choroid, and, with the consent of the patient and of Dr. Sahler, enucleated the eye, on the same day, at the Manhattan Eye and Ear Hospital, and placing it in Müller's fluid, had it sent to the pathologist of the hospital, who herewith makes his own report.

The growth had so enlarged the eyeball that I had to slit the external canthus in order to permit its removal from the cavity of the orbit.

I may add that the patient recovered kindly from the operation and returned home at the end of a week.

She has enjoyed the best of health since the operation, showing no signs of sarcoma of the orbit or of any other part of the system.

MICROSCOPICAL EXAMINATION BY DR. IRA VAN GIESON, PATHOLOGIST TO THE MANHATTAN EYE AND EAR HOSPITAL.

"At one side of the globe the sclera rises over a bluntly conical, dark-colored, nodular tumor, the basal diameter of which is 21 *mm*, and its height 12 *mm* (figs. 1, 2).

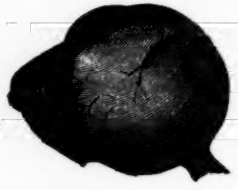

FIG. 1.—Showing a lateral view of projecting portion of the tumor. (Natural size.)

FIG. 2.—Showing a front view of the same. (Natural size.)

The base of this conical projection, anteriorly, involves about one eighth of the sclero-corneal junction, and, extending backward and laterally, covers about one third of the surface of the globe.

A meridional section, including the tumor (fig. 3), shows that the latter occupies about one half of the posterior chamber, and consists of two portions—a larger anterior dark-colored and a smaller posterior light-colored portion. The dark-colored part consists of small spheroidal

cells, and of large round and spindle cells, which contain pigment, and lie in a more or less pigmented stroma. Some portions of this darker mass are more deeply pigmented than others, giving the whole a coarsely, mottled appearance.

The smaller light-colored portion is similar in structure to the darker part, but is almost entirely devoid of pigment.

The *cornea* and *iris* are normal. The *sclera* is thinned over the tumor, and contains streaks and clusters of small spheroidal cells, which also extend into the adjacent limbus. The *ciliary body* on one side is considerably reduced in volume by pressure from the tumor, and with its processes is pushed inward toward the lens.

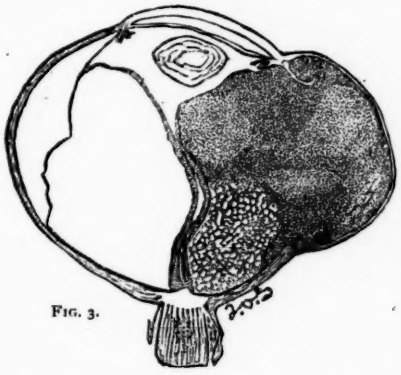

FIG. 3.

The *choroid* on the side of the eye involved by the tumor is apparently absent; the layers of the remaining choroid are pressed together, and the lumina of many of its vessels closed. In places the choroid is adherent to the sclera, which at these places is slightly pigmented. The *retina* is completely detached, and its rods and cones replaced by larger and smaller transparent globules. In some places the topography of the retinal layers is still evident; in other parts the retina is involuted and degenerated.

Grouped together in the spaces between the connective-tissue trabeculæ and the nerve-fibre bundles in one side of the *optic nerve*, there is a limited number of oval and spheri-

cal pigmented cells and coarse pigment granules (fig. 4). Where the tumor abuts against the lens the capsule of the latter is replaced by a thin lamina of new formed, richly cellular connective tissue. The peripheral portion of the lens contains concentrically arranged crev-

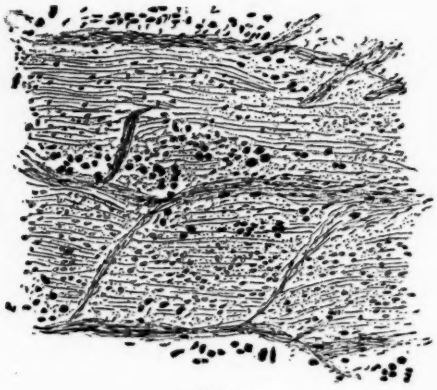

FIG. 4.

ices, some of which are filled with clear fluid; others contain variously sized transparent globules and droplets.

ANATOMICAL DIAGNOSIS: *Melano-sarcoma of the choroid with metastasis of the optic nerve;* detachment and degeneration of the retina; partial degeneration of the lens.

OVER-EXERTION OF THE ACCOMMODATION AND ITS RESULTS.

A CONTRIBUTION TO THE ÆTIOLOGY OF GLAUCOMA AND EQUATORIAL CATARACT.

By Dr. W. SCHOEN, Leipzig.

Translated by J. A. Spalding, M.D., Portland, Me.

(*With a lithographic plate, Tab. I.*)

I HAVE already shown, in a paper on the causation of glaucoma,[1] that most of the so-called physiological excavations have no right to the name, but that they are due to dragging of the vaginal processes of the optic nerve and lamina cribrosa from over-exertion of the accommodation.

The proof that I offered was double; first, that this excavation is more or less pronounced in almost every eye in which the accommodation has long been over-exerted, as, for example, in hypermetropia, presbyopia, astigmatism, and in cases of corneal maculæ whenever proper compensating lenses have not been used. The percentage is much higher than that in which the excavation is found in children. Thus, Germann[2] found but 3.63 per cent. in 220 children eyes, whilst statistics based on 1,800 adult eyes, under my personal investigation, vary greatly from this. For example, in 437 eyes in which an accommodative excavation was to be expected, I found the following proportions:

[1] *Graefe's Archiv*, Bd. xxxi., 4, p. 1.
[2] *Graefe's Archiv*, Bd. xxxi., 2, p. 121.

Excavation.	I.	II.	III.	Total.
Total	8	12	6	= 26
High degree	32	49	43	= 124
Moderate	76	48	52	= 176
Slight	19	19	9	= 47
Absent	16	32	16	= 64
Number of eyes	151	160	126	= 437
Number of persons	76	82	66	= 224

If we reckon the percentages, we find as follows:

Percentage of the so-called physiological excavations:

1. In the 437 eyes in which accommodative excavation was to be expected:

Excavation, on the whole . . . 85 %, *i. e.*, 5–6
Slight to medium excavation. . . 74 %, *i. e.*, 3–4
Extreme, and total excavation . . 33 %, *i. e.*, 1–3

2. In the whole 1,800 eyes of all the patients:

Excavation, on the whole . . . 20 %, *i. e.*, 1–5
Slight to medium excavation . . 18 %, *i. e.*, 1–6
Extreme, and total excavation . . 8 %, *i. e.*, 1–12

Hence, there can be no doubt that, in the majority of cases, the excavation is an acquired one, and that it is found in all stages of development from the slightest trace to the total. There is no substantial difference between the latter and glaucoma simplex.

Its appearance in those eyes upon whose accommodation great strain is made, points at the accommodative process as its cause, and my daily experience permits me to declare "*that the diagnosis of spasm of accommodation can invariably be made in every case of well-pronounced excavation, with red margins around the papilla.*"

My second proof rests upon anatomical preparations from an eye which exhibited well-marked hypermetropia, particularly with a distinct hypermetropic ciliary body, and the so-called physiological excavation. A section shown in the paper above mentioned exhibits a distortion of the vaginal processes and nerve fibres toward each side. This is most pronounced at the spot corresponding to the

border between the sclera and choroid, and is entirely different from that in myopia. For whilst, in the latter, all of the coats of the eye are dragged to the temporal side of the optic nerve, so that the scleral ring is pulled outward in comparison with the axis of the optic nerve, in the hypermetropic section, on the contrary, the axis of the nerve, the width of the inner scleral ring, and its situation relative to that axis are all unchanged, and the vaginal processes are dragged toward *every side* from the axis of the nerve. The muscle of accommodation performs this task by means of its tendons, which consist of the lamellæ of the suprachoroid and lamina fusca, for these terminate in the vaginal processes, and can from that point act directly upon the lamina cribrosa.

I continued my researches for hypermetropic eyes with excavation, and succeeded in finding a second entire eye with an excavation even more marked than in the first case, as well as the posterior section of an eye with traces of the dragging above mentioned (although no distinct excavation was visible), together with incipient equatorial cataract with all the symptoms so excellently described and represented by Becker. The only variation consisted in groups of darker-colored cells and nuclei, shrivelled granules of normal size, enlarged cells, and, finally, globular cells without nuclei.

The epithelial nuclei of the central part of the anterior capsule of the first eye absorbed very little coloring matter, but in the second eye the same locality showed deeply tinted nuclei.

The equator shows the most marked alterations in all respects.

The zonula fibres (Fig. 7) separate distinctly behind the anterior ciliary processes into two columns, the thicker of which curves sharply around the ciliary body, and extends to the anterior capsule, whilst the posterior column, much the thinner of the two, passes from the same spot almost directly to the posterior capsule. Transverse sections show that the zonular space is triangular, the base formed by a bit of capsule 2 *mm* in extent in front of and

behind the equator, whilst the sides are composed of the anterior and posterior zonular fibres, against which the hyaloid proper is closely applied. The insertions upon both anterior and posterior capsules keep almost precisely the same direction, so that the points into which the various zonular fibres expand like a small paint brush, lie in one line, and the insertion lines form upon the posterior capsule a circle which lies about 0.8 to 1 *mm* from the equator of the capsule. The anterior line of insertion lies somewhat nearer the equator than the posterior, and upon the posterior capsule the circle coincides with the epithelial border. The brush or glove-like terminations expand over the anterior and posterior capsules, and gradually melt iuto them. There is, additionally, a third and middle set of fibres which are rarer and not often visible in transverse sections, because they lie singly. But in surface-preparations of the capsule they are always visible. Their insertions follow the same direction as the others, and they unite close behind the equator, directly between the insertions of the other sets of fibres, but their method of insertion is entirely different, since they bore into the capsule like the roots of trees into the earth.

Fine fibres then extend from these roots out over the capsule, and gradually are lost in the latter. In the case of the equatorial fibres, the fibrils run both forward and backward, not like the others, which only run in one direction. The spaces between these three lines are entirely free from insertions.

Figs. 1 and 2 show a bit of capsule with the epithelium in front of and behind the equator. To the right lie the anterior, to the left the posterior zonular fibres, and in the middle, directly left of the equator, the middle fibres, which do not stand quite perpendicular to the capsule, but are bent a little backward.

The cells with deeply tinted nuclei upon the capsule of the first eye (Fig. 1) are grouped unmistakably around the foot of the middle zonular fibres.

The accummulation of intensely colored nuclei is most marked at two points, which correspond to the insertions of the anterior and middle zonular fibres.

If we now turn to the second eye we meet with the same alterations though in more advanced stages. Fig. 2 shows a bit of capsule at both sides of the equator. The form of the cells and nuclei is just the same as in the first case, only Wedl's globular cells are more abundant.

Fig. 3 represents a portion of a section from the anterior capsule where the anterior fibres are attached. We see in the midst of the epithelial cells, Wedl's globular cells, which originate from those epithelial cells which find no place between the rest of the cells along the capsule, and are therefore pressed toward the interior.

Fig. 5 represents a meridional section of the capsule of the first eye directly through the insertion of a middle zonular fibre, with a slight suggestion of fold-formation. The deeply tinted nuclei are heaped up close together at this point, whilst backward they quickly grow scanty, and a little way forward entirely disappear.

The space included in the line *a b* (Fig. 6) is generally lost in meridional sections, or becomes loose in its tissue. No matter however formed the anterior fissure—*a*—is generally empty, while the posterior—*b*—almost always contains a number of larger or smaller globular cells. And we are almost inclined to believe that they find their way here from the equator.

Becker refers the proliferation of the capsular epithelium and the development of the globular cells to cataractous and senile shrivelling of the lens. The shrivelling is primary, the proliferation secondary. The process begins with shrivelling of the nucleus and decrease in the tension of the capsule.

This arrangement of the proliferative processes will lead us in our cases to think that this is not atrophic proliferation, but that the dragging of the zonular fibres undeniably witnessed in the second eye in the appearance of folds, exercises upon the capsular epithelium an irritation which excites the latter into subdivision of cells, but is at first confined to the neighborhood of the foot of the fibres.

If we now combine our results, we find localized inflammatory proliferation of the capsular epithelium directly behind the

equator, corresponding to the insertion of the middle zonular fibres, and a similar proliferation corresponding to the insertion of the anterior zonular fibres, and at this point the lens has begun to participate in the process in the form of incipient cortical cataract.

Since it is rarely possible to verify by autopsy the condition of an eye observed during life, we must compare investigations on the living with corresponding conditions in the dead.

The following incidental case was observed June 19th of this year, and confirms the conditions above mentioned:

Madame S., aged seventy-one; L. E., absolute amaurosis from glaucoma simplex; R. E., S. 20–25, with + 42. Both optic nerves deeply excavated; left nerve white, right redder. Tension not palpably increased. Lens and iris in normal situation, and in both eyes a broad iridectomy coloboma outward done two years before. No nuclear selerosis in either lens. Vitreous transparent. The coloboma permits the equator of the lens to be seen as represented in Fig. 4. A row of fine whitish-gray lines, about 1 *mm* in length and pointing toward the centre of the anterior surface, lies about 1 *mm* from the equator of the lens. An opacification on the posterior surface begins directly at the equator and forms a border about 0.75 to 1 *mm* wide, lying close to the posterior surface. The zonular fibres in their course from the ciliary body to the lens look precisely as in an anatomical preparation; we can even distinguish the separate fibres. Nevertheless with the naked eye we cannot discover any direct connection of the various fibres with the opacities upon the anterior surface.

This condition on the living challenges comparison with the anatomical preparations. The wreath corresponds to the region of the anterior zonular fibres, viz., of Fig. 2 and Fig. 6, and to the appertaining cross-section Fig. 3, the dark border behind the equator to the middle fibres *mz*, of Fig. 2 and Fig. 6, and to the transverse section Fig. 5.

Accommodative excavation was found in the two eyes examined anatomically, glaucoma simplex in the two living eyes. The equator of all four lenses exhibited symptoms

identically alike. Accommodative over-exertion should be regarded as responsible for the whole list.

At the two points therefore where in the accommodative circle different structures are intercalated, viz., the optic nerve and lens, we meet in eyes whose accommodation is greatly over-exerted, alterations which can only be explained by a dragging on the accommodative fibres.

In times past, no one could see any but chemical causes for the origin of cataract, except in traumatic cases; but in the above conditions we recognize a purely mechanical cause.

It might further seem very desirable to show statistical columns of parallelism between exertion of accommodation and the occurrence of capsular and cortical cataract, but here the affair is of quite a different nature, because in a larger number of cases, owing to advancing age, there would be no surprise at finding incipient cataract.

Only large numbers could offer decisive proof; and besides that, the extreme equator of the lens should be accurately examined in all cases, something that cannot well be done in practice, and is quite impossible without dilatation of the pupil.

Explanation of Figures on Plate I.

vZ = anterior
mZ = middle
hZ = posterior
} zonular fibres.

eg = Epithelial border in the rear.
hp = Hyaloidea propria.
Aeq = Equator of capsule and lens.

v = anterior
h = posterior
} surface of the lens.

Fig. 1. Surface preparation of the capsule with the epithelium. Conglomeration of cells with deeply tinted nuclei around the middle zonular fibres. Globular cells at the second fibre. (Hart. Obj. 5, Oc. 2.)

Fig. 2, like Fig. 1. Folds at the foot of the middle zonular fibres. Numerous deeply tinted nuclei near the anterior insertions. Two globular cells on the third and fourth fibres. (Obj. 5, Oc. 2.)

Fig. 3. Meridional section in the region of the insertions of the anterior fibres. Globular cells (*l* = the lens; *e* = epithelium; *k* = capsule). (Obj. 7, Oc. 2.)

Fig. 4. Iridectomized eye, lateral illumination. Wreath-like opacities, in or under the anterior capsule, and opaque border behind the equator corresponding to the posterior capsule. The second contour shows the capsule slightly stripped off.

Fig. 5. Meridional section through the foot of a middle zonular fibre. Diffused epithelial border. Enlarged cells, and deeply tinted enlarged nuclei. In front (upward) the cells that had begun to subdivide cease for a little space, and backward (downward) they rapidly become scattered and few in number. (Obj. 7, Oc. 2, with pushed in tube.)

Fig. 6. Half schematic transverse section of a lens, which demonstrates the cellular proliferation, and conglomeration of globular cells at the insertions of the anterior zonular fibres, as well as the cellular proliferation corresponding to the insertions of the middle zonular fibres. The wavy hyaloidea propria is applied to the posterior zonular fibres, and then continues over the posterior surface ; *a* and *b* are the fissures which are often formed on making sections. Globular cells chiefly lie in the fissure *b*.

Fig. 7. Meridional section; exhibits the triangular space and the arrangement of the posterior and anterior zonular fibres in relation to the capsule and ciliary body ; accurately copied with aid of a photograph. (Obj. 5, Oc. 2.)

PATHOLOGICO-ANATOMICAL INVESTIGATIONS OF THE EYES OF DIABETIC PERSONS.

By Dr. V. KAMOCKI, of Warsaw, Russia.

Translated by Dr. H. A. B. MacCauley, of New York.

(*With two lithographic plates*, Tab. II. *and* III.)

NOTWITHSTANDING much attention has been paid of late years to diseases of the eye appearing during the course of diabetes, our knowledge of the pathologico-anatomical changes upon which these diseases are based is still very scanty. Even in the case of cataract, by far the most frequent complication of diabetes, we have only the results obtained by Prof. Becker, other investigations upon diabetic cataracts extracted without the capsule (Knapp) not being here considered. During my sojourn in Heidelberg, Prof. Becker was kind enough to give me the opportunity of examining four diabetic eyes from different individuals; two of these showed cataract and the other two were apparently normal. Although I can substantially only verify what is already known, the rarity of the material and the fact that I have brought out some new points lead me to hope that my contribution will not be unwelcome. Before instituting a general comparison of the results obtained, which in the main agree with each other, I append a brief statement of the details of each case.

Case 1.—January 19, 1884. Two eyes with diabetic cataract; male, sixteen years. Quantity of urine, 4,000–6,000 *ccm*; 8 % sugar. Death accompanied by intestinal catarrh. The eyes were taken out while warm and immersed in Müller's fluid. A

horizontal section of the right eye was made June 2, 1886, and the upper half, after soaking in water for two days, was imbedded in celloidin, and then sliced with the microtome, stained with hæmatoxylin and hæmatoxylin-eosin, and treated with Canada balsam. Polar diameter of lens, 5.5 *mm;* equatorial diameter, 8.75 *mm.* The unusual thickness of this lens was due to a considerable accumulation of coagulated fluid within the capsule. The nucleus of the lens, considerably fissured and with loosened fibres, appeared as though suspended in this fluid. The vortex of the lens is well preserved in places only. The young fibres are considerably thickened, and numerous vesicle cells are the result of their metamorphosis. The fluid is found not only directly under the capsule, but penetrates through the fine crevices and larger spaces between the lamellæ to the centre of the segmented and relaxed lens nucleus, there coagulating in large drops, giving rise to the peculiar algæ-like appearance. There are, however, more interesting changes in the iris, especially in its posterior pigmentary layer (Fig. 1), which is excessively swollen and softened. Besides this thickening, a peculiar light appearance of the pigmentary layer is remarked. The cells are arranged here and there in layers, are transparent, and distended like a balloon. The pigment, present in very small quantity, is seen rolled up into a ball and crowded with the nucleus over against the cell wall; otherwise the cell seems quite empty. In some places cells have burst and joined with others to form peculiar cystic spaces (Fig. 1, *a*) of remarkable dimensions, which are visible macroscopically, being 1.5 *mm* in width by 0.08 *mm* in height. The outer wall of these cysts consists of coherent cell membranes with shreds of pigment and cell membranes attached to it. The edge of the cornea shows a slight subepithelial inflammatory infiltration, otherwise it is quite normal. The pial sheath of the extrabulbar part of the optic nerve is also somewhat infiltrated.

Case 2.—Mrs. H., forty-three years, bilateral diabetic cataract. Right, linear extraction in November, rapid cicatrization without reaction. Died of pulmonary phthisis, January 21, 1884. Urine contained a large quantity of sugar. The left eye was removed nine hours after death and immersed in Müller's fluid. A year later the eye was prepared for examination in the usual manner. Lens fairly normal.

The above-mentioned changes in the iris were also seen in this case, although the pigmentary layer is not so much

relaxed. The picture seen is more delicate and may be aptly compared to a sample of fine lace (Fig. 5). The epithelium is in two layers, the posterior and more superficial of which is composed of high slim cylindrical cells with clear water-like contents. Fine pigment granules lie upon the cell membrane and the nuclei stained a beautiful blue with hæmatoxylin are distinctly seen. The rarefaction of the pigment in this case gives opportunity for a more exact consideration of the existing conditions of the posterior epithelium of the iris, and yields conclusive evidence of the presence of its two layers. This is best shown on the border of the pupil, where one of the layers is reflected upon the other (Fig. 4). The gradual transition of the posterior layer of the iris into the pars ciliaris retinæ is also quite evident, as is the evolution of the anterior layer into the pigment epithelium of the ciliary body. A certain amount of importance attaches to this statement, as it gives a new proof of the correctness of Schwalbe's[1] conclusion (confirmed by Hirschberg,[2] Koganeï,[3] Boé[4] and Fuchs[5]) that the pigmentary layers of the posterior surface of the iris correspond to the two layers of the secondary ocular vesicle. The condition of the remaining membranes of the eye was quite normal. Cystic formations in those parts of the retina bordering on the ora serrata are frequently seen in the senile eye and will be considered at the end of this article. The rest of the retina is well preserved.

Case 3.—Diabetes mellitus. Louise S., forty-two years, died in the Heidelberg Clinic April 21, 1883. Quantity of urine 6,000–10,000 *ccm*; 4–5 % sugar. Enucleation one hour after death, and one eye immersed in Müller's fluid, while the other was subjected to a chemical examination by Dr. Mays. The chemical examination demonstrated with certainty the presence of a considerable

[1] Lehrbuch der Anatomie der Sinnesorgane. Erlangen, 1883, S. 200.
[2] Ein Fall von Aderhautgeschwulst nebst anatomischen Bemerkungen. *Arch. f. Opthalm.*, Bd. xxii., Abth. i., S. 146.
[3] Untersuchung über den Bau der Iris des Menschen und der Wirbelthiere. *Arch. f. mikrosc. Anat.*, Bd. xxv., Heft i.
[4] Quelques recherches sur la couche pigmentaire de l'iris. *Arch. d'opth.*, Juillet-Août, 1885.
[5] Beiträge zur normalen Anatomie d. menschlichen Iris. *Arch. f. Opth.*, Bd. xxxi, Abth. iii., S. 71.

amount of sugar in the vitreous with slight traces in the cornea. None was found in the lens or aqueous humor. The other eye was prepared for microscopical examination June 5, 1886. The dimensions were normal. The iris was much thinner than in the preceding cases, but shows undoubtedly the same appearances (Fig. 3). The epithelium is disposed in two layers, the posterior of cylindrical cells of moderate height which show unmistakable rarefaction of the pigment and swelling of the cells. The nuclei which are barely visible normally are distinctly seen colored with hæmatoxylin, the contents of the cell however remaining colorless as before. The cells of the anterior layer are quite flat, almost like endothelium, are likewise swollen and show a tendency to breaking down, thus causing a lifting up of the posterior layer in places, it remaining adherent to the capsule of the lens. Upon examination of the optic nerve something new was found in the shape of a considerable colloid mass situated in the papillar tissue inside of the lamina cribrosa, composed of small round bodies with a slight indication of concentric lamellæ. The neighboring nerve tissue seemed simply pushed apart without participating in the morbid process.

Upon the surface of the above structure were seen occasional spindle-shaped nuclei, but no continuous cellular investment. I also found quite similar bodies in the arachnoidal sheath at the place of entrance of the optic nerve. These showed delicate concentric lamellæ and a distinct cuticle of endothelial cells.

Masses resembling these were first noticed by H. Müller in an atrophied optic nerve, and they have been frequently seen in other morbid conditions. Iwanoff has demonstrated their presence in eyes of normal visual power (*l. c.*), and regards them as colloid deposits from the vitreous membrane of the choroid, which have penetrated into the optic nerve. The granules found in the arachnoid I believe to be of endothelial origin, analogous to the so-called "brain sand." To return to the eye in question, I also found an extensive cystic formation, not only in the extreme periphery of the retina, but also in the region of the equator. Moreover, at a circumscribed point in this region, the retina was adherent to the choroid with degeneration and pigment infiltration.

CASE 4.—Enucleation of the diabetic eye one hour after death, by Dr. Da Gama Pinto. Anna S., 31 years; died June 2, 1883, in Heidelberg Clinic, of diabetic coma, cheesy broncho-pneumonia, acute catarrh of both apices of lung, pulmonary and glottis œdema, pneumonia at base of both lungs. According to patient's statement, disease began five weeks before. Quantity of urine, 2,600–3,400 *ccm*; specific gravity, 1.028–1.033; sugar, 4.5–5.3 %. The other eye, according to the chemical analysis of Prof. Kühne, showed 1 *mgrm* of sugar in the vitreous, 0.07–0.2 in the aqueous, with probably a small quantity in the lens (0.2–0.4 *mgrm*), while its presence in the cornea was very doubtful. The microscope in this case gave decidedly negative results, excepting œdema of the extreme periphery of the retina manifesting itself in cystic formations. The remaining retinal structure was without pathological alteration.

To recapitulate briefly the changes found in the lens in the first three cases, we note the following: Commencing proliferation of the intracapsular cells, formation of vesicle cells, and finally, absorption of water by the lens nucleus with resulting loosening of its fibres, drops of water forming in the spaces made by this separation of the fibres. I think I recognize in the above phenomena three successive phases in the formation of cataract (although detailed notes as to the condition of the clouded lenses during life are not at my command).

The lens in Case 3 was transparent during life, although there was evidence of the beginning proliferation of the intracapsular cells, but this can hardly be looked upon as an objection to the above view. Knies[1] and Becker (*l. c.*, Seite 137) have demonstrated that lenses which were quite clear during life may give signs of extensive intracapsular cell proliferation (capsular cataract) when examined with the microscope after death.

Moreover, in our special case, the extent of the process was so slight, and its location so extremely peripheral, that it hardly would have been recognized as an opacity of the lens, even with maximum dilatation of the pupil. The condition of the lens in the second case (formation of

[1] *Zehender's klin. Monatsbl.*, 1880, Band xviii., S. 181.

vesicle cells), in the region of the equator, represents the stage of beginning cloudiness, and corresponds perfectly to Prof. Becker's clinical demonstration of the process (*l. c.*, S. 164). Becker thinks, and is supported in this view by Foerster, that the diabetic cataract first begins with opacity of the outer cortical layers, immediately under the capsule in the region of the equator, the deeper layers, as well as the nucleus, remaining entirely clear.

By the arrangement of the straighter of the vesicular cells and their cone-like accumulation, the above condition of the diabetic opacity of the lens, as well as the primary sector-like separation of the lens surface, may readily be explained.

Finally, as far as my first case is concerned, my observations agree perfectly with those of Becker (*l. c.*, S. 157 u. ff.), so much so that he describes almost word for word the appearances found by me, except that there was more accumulation of fluid within the capsule in my case, causing greater distension of the lens. It is very remarkable that such extensive œdema should exist in a disease presenting so many conditions favorable to the withdrawal of water. The cause of this is probably to be found in the softening and swelling of the capsule, based upon disturbances of nutrition, thus permitting of an abnormal degree of diffusibility (vergl. O. Becker).

The chemical examination of the media of the eye is of considerable importance, according to Becker's statistics (*l. c.*, Seite 165) of thirty-one cases, in which he found positive evidences of sugar in the cataract in twenty-two cases, while two were doubtful. He however calls attention to the fact that it is hardly ever found in the lens unless the urine is highly saccharine, and that consequently there are considerable variations in the quantity of sugar present. As far as unclouded lenses are concerned, Deutschmann (*l. c.*, Seite 143), in a ten-year-old diabetic child, found 0.5 per cent. of sugar in the aqueous humor, 0.366 per cent. in the vitreous, but none in the lens. In one of the cases presented above, Dr. Mays found positive evidence of sugar in the vitreous only, while in the other, analyzed by Prof.

Kühne, the lens and aqueous humor also contained small quantities of sugar. The hypothesis that the formation of cataract in diabetic eyes is a result or partial symptom of general disease of the eye, is substantially supported by the peculiar appearance of the retinal pigment leaf of the iris. This has already been observed and discussed in detail by Becker (*l. c.*, Seite 157 u. 171). It is not easy to formulate an opinion as to the nature of these changes. This much may, however, be said: We have to do with two different processes, an active one with increase of the cells of the posterior layer, and a degenerative one with cell-metamorphosis. The cells, in spite of their resemblance to degenerated goblet cells, appeared to be empty, and were probably filled during life with a clear water-like liquid. They seemed to be hydropic cells, such as are observed in the subcutaneous tissue of the emaciated and œdematous cadaver. Upon inspection of the lithographic plates of the pigmentary layer of three of the eyes, to which the fourth, although unchanged, is added for the sake of comparison, the different stages of this metamorphosis are quite evident, reaching their culminating point in the first case. The implication of the pigmentary layer alone, without changes in the remaining structure of the iris, is very remarkable, and we are not able at present to explain the import of this enigmatical process. The results obtained are nevertheless fraught with importance as furnishing, perhaps, anatomical reasons for many of the variations in the course of diabetic cataract. Leber,[1] for instance, has called attention to the frequent occurrence of severe forms of retinitis complicating cataract in the course of diabetes. Also the fact that four of five of the thereupon examined cases (including Becker's) showed the same changes, is in favor of such an interpretation, and further support is given by the clinical observations of competent specialists. Becker, in his first great monograph, which appeared as a part of the Gräfe-Sämisch handbook, mentions the fact that

[1] Ueber das Vorkommen von Iritis und Iridochoroiditis bei Diabetes mellitus, etc. *V. Grafe's Archiv*, Bd. xxxi., Abth. iv., S. 183 u. ff. Vergl. ebenfalls F. Wiesinger: Ueber das Vorkommen von Entzündung der Iris und Cornea bei Diabetes mellitus. S. 203 u. ff.

in swollen diabetic cataract the borders of the pupil, as well as the limbs of the coloboma, after preparatory iridectomy, appear very wide. Snellen[1] remarks that the pigment of the iris seems often very loose, as in the macerated bulbus. One of Hirschberg's[2] recent communications seems to me to be so important that I take the liberty of quoting it. The case in question was a woman, fifty-four years; quantity of urine, 2,500 *ccm* of s. g. 1,044, containing 7.8 per cent. sugar. "May 15th., R., preparatory iridectomy above. Operation quite normal, the patient remaining very quiet; total absence of posterior synechiæ. The whole uveal layer of the iris remained in the coloboma. A small opening was noticed in the uveal layer. In hundreds of iridectomies, I have only seen this happen once before, in the case of an anæmic girl with cortical cataract. Uninterrupted cicatrization." And farther on: "May 20, 1884, L., preparatory iridectomy above. The whole uveal layer remained caught in the coloboma. This time I removed it with the forceps. Uninterrupted cicatrization. The cataract was somewhat swollen, with long, broad cortical stripes, but was far from being ripe."

Lately, Hirschberg reports a new case of diabetic cataract, where, upon the performance of preparatory iridectomy, large shreds of the uveal tract were torn away, and the aqueous humor looked like ink (*Centralbl. f. prakt. Augenheilk.*, Julyheft, 1886, S. 196).

The peculiar condition of the iris described in the preceding pages, explains this fully, I think, and renders further comment upon the observations cited unnecessary. In conclusion I would say that I have given special attention to three cases lately described by Fuchs,[3] in which he mentions fissure-like spaces ending by crypt-like openings upon the anterior surface of the iris (Fig. 1, *b*). Fuchs believes these to be lymph spaces, but the result of my own observation does not confirm this. The extensive cystic

[1] Vergl. O. Becker: Zur Anatomie der gesunden und kranken Linse. S. 171.
[2] *Centralbl. f. prakt. Augenheilk.*, Juniheft, 1884, S. 187.
[3] *Archiv f. Ophthalm.*, Bd. xxxi., Abth. iii., S. 59.

formation in that part of the retina bordering upon the ora serrata, observed in the last three of my cases, is worthy of more exact consideration. Iwanoff,[1] as is well known, has tried to establish a connection between this apparently harmless affection and the formation of cataract, after verifying its existence in sixteen out of eighteen cases of ordinary senile cataract. Henle, however, has found it so often present that he believes it to be normal. Iwanoff thinks it the manifestation of chronic retinal œdema, while Landsberg,[2] on the other hand, finds the cause of the cystic formation in a peculiar degeneration of the outer granular layer of the retina. I regard Iwanoff's views as most plausible, and think the appearance of that part affected with cystic formation is more due to pressure than to real degeneration processes. The results of my investigations are the more interesting from the fact that only one of my relatively young subjects was affected with cataract, while according to Iwanoff's extensive researches the changes found are peculiar to the later periods of life.

EXPLANATION OF PLATES II. AND III.

FIG. 1. Horizontal meridional section of eye of sixteen-year-old diabetic girl (Case 1). Hartnack Syst. II., Oc. 2. Penetration of water within the lens capsule; fibre separation; formation of vesicle cells; algæ-like figures. In the retina at *a*, cystic formation in the pigmentary layer; at *b*, lymph spaces of Fuchs' opening upon the anterior surface of the iris.

FIG. 2. Iris of diabetic individual (Case 4) thirty-one years old. Pigment of the iris at *a* is normal; *b* = posterior limiting layer of iris (Fuchs); *c* = stroma of the iris. Zeiss' system, C, Oc. 3.

FIG. 3. Iris of a diabetic woman forty-two years old (Case 3). At *a* the posterior lamella of the pigmentary layer, composed of cylindrical cells which have become much lighter; *b* = the low partly broken-down cells of the anterior layer; *c* = posterior limiting layer; *d* = iris stroma.

FIG. 4. Pupillar edge of the iris in Case 2. The reflection of

[1] Beiträge zür normalen und pathologischen Anatomie des Anges. *Archiv für Ophthalm.*, Bd. xv., Abth. ii., S. 90.

[2] Ueber cystoide Degeneration der äusseren Körnerschicten. *Arch. f. Ophthalm.*, Bd. xxiii., Abth i., S. 203.

the pigmentary layers, one upon the other, is very distinct. Cells of posterior layer (*a*) are high and cylindrical ; those of the anterior, cubical ; *c* = sphincter of iris ; *d* = cells containing pigment, Koganeï. Zeiss' system C, Oc. 3.

FIG. 5. A more peripheral portion of same iris. *a* = cells of posterior pigmentary layer ; *b* = broken-down cells of anterior layer ; *c* = posterior limiting layer of iris ; *d* = iris stroma. Zeiss' system C, Oc. 3.

FIG. 6. A part of Fig. 1, with Zeiss' system C, Oc. 3. *b* = the pigmentary layer of the iris very much loosened, appearing in several layers with clear, vesicular, balloon-like cells ; the nuclei are here and there visible, in other places obscured by pigment ; *a* = sphincter of the iris.

REPORT ON THE FIRST SERIES OF ONE HUNDRED SUCCESSIVE EXTRACTIONS OF CATARACT, WITHOUT IRIDECTOMY.

By H. KNAPP, M.D.

THE series of cataract extractions considered in the following report were performed in New York City, the great majority at the Ophthalmic and Aural Institute, from June 10, 1886, to November 13, 1887. During this interval of time I made 117 extractions of cataract, among which 17 with iridectomy, according to von Gräfe's method. The necessity or advisability of the iridectomy was recognized either before or during the operation. The cases in which a subsequent excision of the iris was made for prolapse or glaucoma (1 case) are comprised in the present series. It results from these figures that I made an iridectomy in ¼ or 15 % of the cases. On February 21, 1887, I read a paper on cataract extraction without iridectomy before the Ophthalmological Section of the New York Academy of Medicine, which was based on the 29 first cases of the series under consideration. As this paper was published in these ARCHIVES, March, 1887, (vol. xvi., p. 54, etc.,) I can refer to it and begin this report with a tabular synopsis of the remaining 71 cases, but I first beg leave to supplement the above publication by a statement of the further changes that have come to my notice concerning the first 29 cases. I have endeavored to obtain as complete records as possible, not only during the time the patients were under my daily care at the hospital, but also later, asking them to come to me and be examined again,

or to send me letters either personally or through their physicians; and I have written to those of whom I had notes only on the primary visual results. We all know, however, that, in spite of every effort, such reports must remain more or less incomplete; yet with all their shortcomings they draw the most trustworthy picture of our work, bringing out, in the number and kind of accidents, our lack of experience and skill, while the results demonstrate the correctness or fallacy of the principles and rules that guided our minds and hands.

Case 7 had V $\frac{20}{200}$ at time of discharge, 12 days after extraction; discission 5 weeks later gave in 4 days V = $\frac{20}{70}$, in 8 months V = $\frac{20}{30}$.

Case 8. Primary V = $\frac{20}{100}$, in 8 months = $\frac{20}{40}$, in 10 months = $\frac{20}{30}$; disc. advised.

Case 11. Prim. V = $\frac{20}{100}$, with large prolapse, which in 6 months had spontaneously and completely disappeared; V = $\frac{20}{70}$.

Case 16. Prim. V = $\frac{20}{60}$; disc. in 6 months, V = $\frac{20}{30}$.

Case 17. Prim. V = $\frac{2}{200}$, later $\frac{10}{200}$; in 3 months, $\frac{20}{200}$.

Case 18. Prim. V = $\frac{0}{200}$; disc. 8 months later, V = $\frac{15}{200}$. Old corneal opacities prevent better vision.

Case 21. Prim. V = $\frac{10}{200}$, in 10 weeks = $\frac{20}{40}$, in 6 months = $\frac{20}{30}$.

Case 23. Prim. V = $\frac{20}{100}$, in a year $\frac{20}{70}$.

Case 24. Prim. V = $\frac{10}{200}$; disc. in 4 months, V = $\frac{20}{40}$.

Case 25. Prim. V = $\frac{20}{70}$; disc. in 3 months, V = $\frac{20}{30}$.

Case 26. Prim. V = $\frac{20}{70}$; in 4 weeks = $\frac{20}{40}$; in a year = $\frac{20}{60}$; disc., V = $\frac{20}{30}$.

Case 29. Prim. V = $\frac{20}{70}$; disc. in 2 months, V = $\frac{20}{30}$.

No.	Name, Age, General Health.	Character of Cataract, Functional Examination.	Operation, Incidents, Healing Process, Duration of Treatment, Secondary Operation.	Primary and Ultimate Vision. Remarks.
30	Mrs. M. Fleck. 49. Good.	Almost mature. Normal.	March 3, 1887. Conjunctival flap. During capsulotomy lens and some *vitreous* expelled by sudden contraction of lids. Iris reduced. Wound closed slowly, *Iris folded back.* 35 days.	$\frac{20}{100}$.
31	Mrs. Cors. 60. Good.	Hard, ripe. Normal.	March 23. Conjunctival flap. 15 days.	$\frac{20}{70}$.

No.	Name, Age, General Health.	Character of Cataract, Functional Examination.	Operation, Incidents, Healing Process, Duration of Treatment, Secondary Operation.	Primary and Ultimate Vision. Remarks.
32	Mrs. Bache. 27. Good.	Soft. Normal.	March 24th. Speculum removed after division of capsule. Lens expelled by pressure with lids. 20 days.	$\frac{20}{70}$. Discission on 14th day. $\frac{20}{30}$.
33	Mr. Gallagher. 66. Good.	Hard, ripe. Normal.	March 24th. Small conjunctival flap. 14 days.	$\frac{20}{70}$.
34	Mrs. Townsend. 54. Good.	Morgagnian. Normal.	April 4th. No injection into ant. chamber. 13 days.	$\frac{20}{70}$. Disc. 23d day. $\frac{20}{30}$; $\frac{20}{30}$ in 9 mos.
35	Mr. Stanton. 56. Good.	Hard, ripe. Normal.	April 4th. Pupil oval, by iris, partly *tiltea back*. 20 days.	$\frac{20}{200}$.
36	Jas. Christian. 67. Good.	Hard, ripe. Normal.	April 11th. 16 days.	$\frac{20}{70}$. Disc on 17th day. $\frac{20}{30}$.
37	Charles Mills. 67. Good.	Hard, ripe. Normal.	April 13th. Large conjunctival flap. 17 days.	$\frac{20}{30}$.
38	Mrs. Coulter. 67. Good.	Almost mature. Normal.	April 13th. 19 days. Pupil oblong; iris *adherent* to scar.	$\frac{20}{100}$. Disc in 11 months. $\frac{20}{100}$ in 3 weeks.
39	Mr. Butler. 66. Colored, good.	Hard, ripe. Normal.	April 14th. Conjunctival flap. Horizontal superior division of capsule. 15 days.	$\frac{20}{100}$. Capsule evenly stretched across pupil. 9 months, capsule wrinkled, $\frac{20}{200}$. [Disc. necessary.]
40	Cath, Gill. 55. Good.	Hard, ripe. Normal.	April 16th. 16 days.	$\frac{20}{200}$. Disc in 9 mos. $\frac{20}{30}$.
41	Mr. Stewart. 59. Bright's disease; alcoholism.	Hard, ripe. Normal.	April 16th. 14 days. Pupil round; no adhesions.	$\frac{20}{70}$. 9 weeks after ext. crucial division, followed by *acute glaucoma*. Iridect. 2 days later. Rapid recovery. $V = \frac{20}{50}$. Died 2 months later.
42	Mrs. Donovan. 68. Good.	Hard, ripe, complicated. Normal.	April 23d. Some *irido-capsulitis*; subsiding in 3d week. 29 days.	$\frac{20}{200}$. Old trachoma and maculæ corneæ.
43	James Couser. 75. Good.	Hard, ripe. Normal.	April 23d. Conjunctival flap. 18 days.	$\frac{20}{70}$.
44	Mrs. King. 51. Good.	Hard, ripe. Normal.	April 23d. 23 days.	$\frac{20}{30}$.
45	Mr. Thoma. 67. Good.	Hard, ripe. Normal.	April 23d. 15 days.	$\frac{20}{50}$; in 2 months $\frac{20}{200}$. Discission $\frac{20}{40}$.

No.	Name, Age, General Health.	Character of Cataract, Functional Examination.	Operation, Incidents, Healing Process, Duration of Treatment, Secondary Operation.	Primary and Ultimate Vision. Remarks.
46	Mrs. Laverack. 74. Good.	Hypermature. Normal.	May 4th. Conjunctival flap. Expulsion of lens laborious. *Intense iritis with closure of pupil.* 19 days.	$\frac{1}{60}$. In 5 months $\frac{4}{200}$. Discission, $\frac{20}{30}$.
47	Mr. Vinton. 52. Good.	R.—Hard, ripe. Normal.	May 4th. 13 days.	$\frac{20}{60}$. Discission, $\frac{20}{30}$.
48	Mr. Vinton. 52. Good.	L.—Hard, ripe. Normal.	May 17th. 13 days.	$\frac{20}{60}$. Discission, $\frac{20}{30}$.
49	Pet. Bowman. 56. Good.	Hard, ripe. Normal.	May 7th. 14 days.	$\frac{20}{200}$.
50	Mrs. Graddy. 60. Good.	Morgagnian. Normal.	May 11th. Lens removed with capsule. Iris reduced. No injection into chamber. 19 days.	Fundus perfectly clear. Pupil round. V. excellent, $\frac{20}{30}$ (estimated, patient cannot read).
51	Mr. Bietz. 65. Good.	Hard, ripe. Normal.	May 11th. 15 days.	$\frac{20}{200}$. Discission, in 5 days $\frac{20}{100}$; in eight months $\frac{20}{30}$.
52	Mr. L. Kahn. 66. Good.	Hard, ripe. Normal.	May 13th. 16 days.	$\frac{20}{400}$. Disc. in 5th week; $\frac{20}{200}$ 7 days later; $\frac{20}{30}$ 9 months later.
53	Mr. Suydam. 84. Feeble.	Hypermature.	May 12th. 21 days.	$\frac{20}{200}$. Discission, $\frac{20}{60}$.
54	Mrs. M. Beyer. 54. Good.	Hard, ripe. Iris atrophic.	May 17th. Pupil oblong; iris *adherent* to scar.	$\frac{20}{200}$
55	Mrs. Kean. 76. Good.	Hard, ripe. Normal.	May 20th. Two filiform *adhesions*. 20 days.	$\frac{20}{200}$. Disc. on 30th day; $\frac{20}{70}$ 5 days later.
56	Mrs. Ehrlich. 77. Bronchitis.	Hard, ripe. Normal.	May 19th. Some filiform *adhesions* and opacities in pupil. 25 days.	$\frac{20}{200}$. Disc. on 25th day. $\frac{20}{70}$; 8 days later.
57	Miss A. Knoop. 60. Asthma. Severe spells of coughing.	R. — Hypermature. Normal.	May 24th. 13 days.	$\frac{20}{200}$. Disc. on 34th day, $\frac{20}{40}$; $\frac{20}{30}$ in 7 months.
58	Miss A. Knoop. 60. Asthma. Severe spells of coughing.	L.—Hard, ripe. Normal.	Oct. 12th. No reaction. 16 days.	$\frac{20}{60}$. Disc. 2 months; $\frac{20}{30}$ in 2 months.
59	Mrs. Hand. 60. Good.	Hard, ripe. Normal.	May 25th. *Mild iritis*, with synechiæ below and some opacity of capsule. 20 days.	$\frac{20}{100}$. Disc. on 20th day; $\frac{20}{70}$ 5 days later.
60	Mrs. A. Simon. 42. Good.	Half-hard. Normal.	May 27th. 13 days.	$\frac{20}{60}$. Disc. on 13th day; $\frac{20}{30}$ 4 days later; $\frac{20}{20}$ a month later.

No.	Name, Age, General Health.	Character of Cataract, Functional Examination.	Operation, Incidents, Healing Process, Duration of Treatment, Secondary Operation.	Primary and Ultimate Vision. Remarks.
61	Mrs. H. Lindsay. 65. Good.	Hard, ripe. Normal. Myopia.	May 31st. Circumcorneal injection. No synechiæ. 17 days.	$\frac{20}{200}$. Disc. on 18th day, $\frac{20}{100}$.
62	Mr. Mathews. 60. Good.	Hard, ripe. Normal.	June 6th. Two filiform *adhesions*. 13 days.	$\frac{20}{70}$.
63	Mrs. Parks. 61. Good.	Hard, ripe. Normal.	June 7th. Some pericorneal injection. 17 days.	$\frac{20}{100}$. Disc. on 21st day; $\frac{20}{40}$ 9 days later; $\frac{20}{30}$ 6 months later.
64	Mrs. Weid. 60 Good.	Ripe. Normal.	June 14th. 16 days.	$\frac{20}{70}$.
65	Dr. Orendorf. 56. Good.	Ripe. Normal.	June 14th. 15 days.	$\frac{20}{60}$. Disc. on 16th day; $\frac{20}{30}$ a week later.
66	Mr. Murphy. 45. Good.	Ripe. Normal.	June 21st. One filiform *adhesion*. 11 days.	$\frac{20}{60}$. Disc. on 21st day, $\frac{20}{30}$.
67	Mrs. Johnson. 65. Good. Traces of albumen in urine.	Ripe. Normal.	June 21st. Ruptured wound on sixth day by hurting her eye. Small *prolapse* in centre of section, which I *reduced*. Pupil central again. No reaction.	$\frac{20}{200}$. Disc. on 20th day; $\frac{20}{100}$ in 5 days; $\frac{20}{30}$ later.
68	Mrs. Hearn. 60. Good.	Ripe. Normal.	June 23d. 14 days.	Disc. $\frac{20}{200}$. Disc. on 14th day; $\frac{20}{70}$ 5 days later.
69	Mr. Vetter. 45. Good.	Ripe. Normal.	June 23d. Great difficulty in clearing pupil. Rubbing and Daviel's spoon. 14 days.	$\frac{20}{70}$. Disc. on 21st day; $\frac{20}{30}$ three months later.
70	Cath. Leydinger. 46. Normal.	Ripe, complicated. Normal.	Sept. 9th. Patient very refractory. *Fluid vitreous* escaped. Patient etherized to reduce iris. No irritation in healing, but *moderately large prolapse* of iris. 24 days.	$\frac{20}{100}$.
71	McCrystal. 50. Good.	Ripe. Normal.	Sept. 14th. Small peripheral part of *iris fell before knife*; excised. Pupil central, round. 19 days.	$\frac{20}{100}$. Disc. in 6th week; $\frac{20}{50}$ in 2 weeks; $\frac{20}{30}$ in 3 months.
72	Aaron Weise. 50. Good.	Ripe, complicated with glauc. simpl. Normal.	Sept. 19th. Patient restless. Small *prolapse*. Post. *synechiæ*. O. d. white; beginning of cupping. 17 days.	$\frac{15}{200}$. 4 months later: Incarceration of iris; no irritation; both Odd. whitish, somewhat cupped. $\frac{15}{200}$. Disc. in 5 months; S. $\frac{20}{100}$ in 4 days; $4\frac{1}{2}$ months, $\frac{20}{70}$.

No.	Name, Age, General Health.	Character of Cataract, Functional Examination.	Operation, Incidents, Healing Process, Duration of Treatment, Secondary Operation.	Primary and Ultimate Vision. Remarks.
73	Fr. Fischer. 46. Good.	Ripe. Normal.	Sept. 19th. 13 days.	$\frac{20}{70}$. Capsule veils fundus. Disc. in 4½ months; $\frac{20}{70}$ in 3 days; $\frac{20}{30}$ in 26 days.
74	Mrs. Fitzgerald. 62. Good.	Ripe. Normal.	Sept. 23d. 12 days.	$\frac{20}{70}$. $\frac{20}{40}$ in a month.
75	Mrs. Low. 62. Good.	Ripe. Normal.	Sept. 26th. Considerable cortex left. No reaction. Pupil round. 16 days.	$\frac{20}{100}$. Disc. on 33d day. $\frac{20}{70}$ in 5 days.
76	Mrs. Goldsmith. 69. Good.	Ripe. Normal.	Sept. 30th. Operation and healing of eye undisturbed. On 3d day, headache, nausea, and persistent, uncontrollable vomiting for 3 days (had such attacks before), then coma and *death*.	Condition of eye unexcelled. ($\frac{20}{15}$, estimated.)
77	Mrs. Stinitzka. 60. Good.	Ripe. Normal.	Oct. 1st. Pupil vertically oval. *Adherent to scar.* 14 days.	$\frac{20}{200}$. Disc. in 6th week; $\frac{20}{100}$ in 5 days; $\frac{20}{30}$ in 3 months.
78	Mr. Moore. 47. Good.	R.—Immature. Cortex transparent. V = $\frac{6}{200}$.	Oct. 4th. Lens and cortex escaped together completely. 14 days.	$\frac{20}{70}$. Disc. 2 months, V $\frac{20}{30}$.
79	Mrs. Devlin. 63. Good.	Complicated excessive myopia.	Oct. 5th. Hurt herself on changing dressing. Pupil oblong. (Adhesion of iris.)	$\frac{10}{200}$. Disc. 18th day; $\frac{20}{200}$ in 4 days.
80	Miss Geering. 22. Good.	Soft, ripe. Normal.	Oct. 6th. Patient restless. *Moderate prolapse.* No reaction. 16 days.	$\frac{20}{100}$. Prolapse cu. 21st day. Disc. 35th day, $\frac{20}{30}$.
81	Mrs. Murphy. 73. Feeble.	Complicated. Normal.	Oct. 6th. Extensive subconjunctival hemorrhage. No reaction. 20 days.	$\frac{10}{200}$. Atrophy of chor. in region of yellow spot. Died soon.
82	Mrs. Smith. 60. Good.	Ripe. Normal.	Oct. 7th. No reaction. 15 days.	$\frac{20}{200}$. $\frac{20}{100}$ in 5 weeks.
83	Ella Stein. 13. Good.	Ripe. Normal.	Oct. 10th. Capsule extracted with Mathieu's forceps. 12 days.	$\frac{20}{40}$.
84	Mrs. Cors. 60. Good.	L.—Ripe. Normal.	Oct. 12th. *Small prolapse.* 15 days.	$\frac{20}{100}$. Prolapse cystoid; abscised 2 mos. later. No reaction. V good, $\frac{20}{30}$ (estimated).

No.	Name, Age, General Health.	Character of Cataract, Functional Examination.	Operation, Incidents, Healing Process, Duration of Treatment, Secondary Operation.	Primary and Ultimate Vision. Remarks.
85	Mrs. Bradley. 75. Good.	Hypermature. Normal.	Oct. 14th. Capsule and lens removed with Mathieu's forceps. Pupil round. Pat. restless. *Prolapse* of iris. 21 days.	$\frac{20}{100}$.
86	Mrs. Crait. 56. Good.	Ripe. Normal.	Oct. 15th. 14 days.	$\frac{20}{60}$. 3 weeks.
87	Dr. Cr. 63. Good. Diabetes.	Hypermature. Normal.	Oct. 14th. Thickened portion of capsule removed with Mathieu's forceps. A good deal of manipulation in clearing the pupil thoroughly and reducing the iris. Thorough washing out of ant. ch. Intense pain first night. No discomfort afterward. Pupil round, central, clear. 20 days.	$\frac{20}{60}$ in 20 days; $\frac{20}{30}+$, 6 weeks; the same in 4½ months.
88	Mrs. Schurich. 70. Feeble.	Morgagnian, complicated. Normal.	Oct. 18th. 14 days.	$\frac{20}{100}$. With + 7. Large crescent; rarefaction of choroid.
89	Mr. Eno. 67. Good.	Ripe. Normal.	Oct. 28th. 15 days.	$\frac{20}{70}$. Disc. on 30th day, $\frac{20}{30}$.
90	Mrs. McQuiry. 47. Good.	Ripe. Normal.	Oct. 28th. Pupil central. Iris *adherent* at periphery. 16 days.	$\frac{20}{100}$. Disc. in 4 mos.; $\frac{20}{40}$ in 3 mos. $\frac{20}{30}$ in 5 days.
91	Mr. Schuman. 66. Diabetes (5 % of sugar).	L.—Ripe. Normal.	Oct. 29th. *Incarceration* of iris, pupil oblong. No reaction. 20 days.	$\frac{15}{200}$. Disc. on 33d day; $\frac{20}{200}$ 6 days later.
92	Mrs. Morgan. 80. Feeble.	Ripe. Normal.	Nov. 3d. No reaction. Pupil slightly oblong; iris *adherent*. 14 days.	$\frac{20}{60}$. Disc. in 4 mos.; V = $\frac{20}{30}$.
93	Mrs. Laverack. 75. Good.	R.—Ripe. Normal.	Nov. 3d. Some synechiæ above and below. 14 days.	$\frac{20}{200}$. Disc. in 20 days; $\frac{20}{40}$ 6 days later.
94	Miss Jones. 29. Good.	Soft. Normal.	Nov. 4th. 9 days.	$\frac{20}{100}$. Disc. on 40th day; $\frac{20}{40}$ 4 days later; $\frac{20}{30}$ 3 mos. later
95	Mrs. Kirman. 82. Paralysis agitans.	Hard, ripe. Normal.	Nov. 6th. 15 days.	$\frac{20}{70}$.

No.	Name, Age, General Health.	Character of Cataract, Functional Examination.	Operation, Incidents, Healing Process, Duration of Treatment, Secondary Operation.	Primary and Ultimate Vision. Remarks.
96	Mrs. Barnett. 74. Good.	Cataracta nigra complicata. Normal.	Nov. 7th. Escape of a drop of *vitreous*. Iris *tilted* back. No subsequent protrusion. Healing undisturbed. 14 days.	$\frac{15}{200}$ on 14th day; in 3 months $\frac{20}{50}$. Atrophy of choroid. Pupil oblong. Synechiæ in upper part.
97	Mrs. McCowan. 59. Good.	Ripe. Normal.	Nov. 8th. 14 days.	$\frac{20}{100}$. Disciss. 56th day; $\frac{20}{60}$ 5 days later. Exposed herself at home. Pain and diffuse opacity of vitreous. Recovered quickly by leeches, salicyl. of soda. V = $\frac{20}{40}$.
98	Mr. Vail. 70. Diabetes.	Morgagnian. Normal.	Nov. 9th. Parotitis on 9th day, lasting 3 days, not interfering with undisturbed recovery of eye. 18 days.	$\frac{20}{200}$. Disc. on 14th day; $\frac{20}{100}$ 4 days later; $\frac{20}{40}$ 3 weeks later.
99	Mr. Volckmer. 64. Good.	Ripe. Normal.	Nov. 12th. Pain in first night, swelling of lids. Spongy exudation and some lens matter in ant. chamber; both absorbed slowly. No discomfort from 2d day. Abscission of small *prolapse of iris* on 5th day. No reaction. 21 days.	$\frac{20}{200}$. Coloboma and adherent iris. Disc. in 3 mos; V = $\frac{20}{100}$ 2 weeks later.
100	Mrs. Dillon. 65. Good.	Ripe. Normal.	Nov. 13, '87. Pupil excessively small. Iris reduced with difficulty. Patient restless. Prolapse of iris noticed on 4th day and cut immediately. Incarceration of iris in both corners. Healing smooth. 22 days.	$\frac{20}{200}$. Disc. in 2 mos. V = $\frac{20}{50}$.

In the subsequent remarks, to avoid repetition, I shall refer to my former paper in vol. xvi., p. 54, etc., of these ARCHIVES, and add only such statements as increased experience may suggest.

As to the **propagation** of the method of simple extraction, two authoritative voices in Germany have pronounced themselves in favor of this method. They are Prof. SCHWEIGGER, of Berlin, whose paper "The Return to the Flap-Operation," in vol. xvi., p. 447, etc., our readers, no doubt, have read with great interest, and Prof. SATTLER, of Prague, whose views are published in the Transactions of the Nineteenth Meeting of the German Ophthalmological Society at Heidelberg (September, 1887), page 92, etc., where also some very instructive remarks on this subject by Dr. E. MEYER, of Paris, are found. In the city of New York the simple method continues to be pursued, with critical consideration, by a number of oculists, Noyes, Bull, Grüning, Webster, and others. Bull reported [1] in the last meeting of the American Ophthalmological Society 36 cases without a loss (one eye, blind before, gave no visual result). Dr. Hasket Derby, of Boston, in an article just published and entitled: "On the Dangers of Simple Extraction of Cataract," [2] writes: "I have been enabled to collect the notes of 48 cases of simple extraction performed in Boston within the last three years, nearly all by two surgeons, both of whom had had a large experience in the Graefe operation. Results: Central pupil in 31 cases, distorted pupil in 5, hernia of the iris in 12. Vision: 0.1 or more in 40, moderate in 5, $\frac{1}{\infty}$ in 2, still under treatment, 1." These results Derby justly considers as unfavorable and asks: "May not the operation, however, be restricted to certain cases, under special rules?" He comes to the conclusion: "Even if these or similar rules be followed, I cannot resist the belief that for the average surgeon, and in the present state of our knowledge, simple extraction, at the best, involves an element of danger that is wanting in the method of v. Graefe." The same criticism has been raised against the revival of the flap-extraction in Germany, England, and even in France, the country which is honored by its invention.

The following remarks will show on which side the present writer stands:

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[1] Transactions of 1887, vol. iv., p. 413.
[2] *Boston Med. and Surg. Jour.*, February 23, 1887, p. 189.

On the **preparation of the patient** before the operation I have nothing new to suggest. I have continued to operate in the patient's room and the

Method of Operating

has not been changed or varied in any thing essential since my publication in these ARCHIVES. Personally I have had no inducement to lay aside Gräfe's narrow knife and return to the triangular (Beer-Richter) knife, for I have found the former convenient and well adapted to its object. I have continued to place the patient on the operating chair, because the chair can be easily moved toward the window and the source of artificial light (I use a drop-light with an Argand gas-burner), and during the progress of the operation it can be readily turned, if need be, so that for each step the best illumination may be secured. To operate on the patient in his bed, as we used to do before the introduction of the combined extraction, has, no doubt, certain advantages, for I am afraid that the transport of a blindfolded person from the chair to his bed may, in some cases, cause displacement of the iris. This risk can, however, considerably be guarded against by letting him remain in the operating chair until the eserine has had its full effect in contracting the pupil, *i. e.*, about ten to fifteen minutes. At the expiration of that time the eye may be inspected once more, and any thing wrong, in particular a prolapse of the iris, be removed prior to the application of the definitive dressing. The consumption of time is compensated for by greater safety.

Before and since I became acquainted with Dr. F. Valk's iris-retractor,[1] I have drawn, with the well-known wire loop, the pupillary portion of the iris towards the centre of the section in order to facilitate the exit of the lens. This was done only in cases where, by rigidity of the sphincter portion of the iris, the pupil did not readily dilate, but I found that the pupillary edge of the iris was apt to be notched

[1] F. Valk: Report of four operations for the removal of cataract without an iridectomy, and by an entirely new method. *The Post-Graduate*, New York, 1887.

and a round pupil was not so easily reëstablished. In such cases, I think, a small iridectomy is preferable. The proposition of Valk to draw the iris towards the periphery prior to the opening of the capsule, has appeared very tempting to me, for it would enable us to make a sufficient peripheric capsulotomy, and thus obviate the frequent formation of posterior synechiæ inherent to the laceration of the centre of the capsule. Yet I have not tried it, because it introduces a new step into an operation that is already complicated and delicate enough, and the posterior synechiæ have thus far, in my practice, proved harmless. I await further information on the part of Dr. Valk, for everybody cannot try every thing.

It is of importance that the *flap be of sufficient size;*—for a ripe, hard cataract fully two fifths of the corneal edge of the limbus conjunctivæ. A conjunctival flap is somewhat in the way during the operation; but I think it acts favorably on the closure of the wound. That it is a protection from secondary infection I am fully convinced of.

Extended experience has confirmed Dr. Panas' and my own statements that the *peripheric location of the corneal section does not in itself favor the occurrence of prolapse of the iris.*

In the majority of cases the *capsule* was *opened* in the centre by a cystotome; some trials to open it at the periphery, by carrying the point of the instrument behind the iris, were not continued, because the escape of the lens proved not so easy as when the centre was opened. Yet I carry the point of the instrument high up, and add a horizontal stroke in the upper part, as v. Gräfe used to do. In this way the lens tilts very readily.

The mode of expelling the lens differs from that used in the combined extraction. The pressure should be made through the cornea on the lower portion of the lens, directly towards the centre of the globe. In this way the flap rises, tilts forward, and the lens passes through the pupil with the least bruising of the iris. This is the old classical procedure; but we have gradually departed from it, because in the combined method the lens can be pressed out more di-

rectly, whereas in the simple extraction direct upward pressure would be counteracted by the iris stretching like a retentive bandage over the advancing edge of the lens.

In a number of cases, in all where the centre of the capsule was thickened, I tried to *remove the pupillary portion of the anterior capsule*, and mostly succeeded. I used for that purpose a pair of Mathieu's iris-forceps, the teeth of which are on the back, but close to the point. This instrument, the excellent and well-known modification of Liebreich's iris-forceps, has been invaluable to me since I first saw it in London in the year 1871.[1] I am not aware that the numerous capsule forceps which have been described during the last years are in any way superior to Mathieu's. The indications for removal of the central part of the anterior capsule have not been very frequent in the present series. It is not impossible that I may soon try to do this step in every case as is recommended by many operators. During several years I have done it regularly in Gräfe's operation, but for the present I seek to obtain the maximum of visual acuteness by an after-operation. More of this hereafter.

The *removal of the cortex* was done, in the first place, by following up the escaping cataract with the spoon, continuing the pressure, so that, if possible, the whole cortex came forth with the lens. A great deal can be accomplished in this way by judicious, bold, and quick action. The moment the lens is out the speculum should be removed, and in case any remnants lag behind, they should be wiped out with the edge of the lower lid, taking care that neither the edge of the upper lid, nor any other organic part, be passed through the wound. If there is a conjunctival flap, the remnants can be stroked out by passing the edge of the lower lid or a blunt spatula over it. These pressing movements with the lower lid, which can be done boldly and without injury, are very efficient, and it seems to me that where they fail other means are not likely to succeed.

During the operation, and immediately after it, the eye, especially the wound, was frequently *irrigated with Panas'*

[1] See my description of it and my appreciation of its advantages in these ARCHIVES, vol. ii., pt. 2, p. 158, 1872.

solution, not only to prevent infection, but also to counteract the rapid exsiccation of the surface of the cornea. When the iris was reduced and the pupil round and central, I injected, with a delicate lachrymal syringe, a few drops of this solution into the anterior chamber, passing the nozzle of the instrument along the whole wound canal, while the liquid was flowing out. My object was to sterilize the whole region of the wound, not to remove coarse remnants of lens. When a good deal of manipulation had been necessary to clear the pupil and reduce the iris, I injected a larger quantity. When, on the other hand, the lens came out entire and the iris re-entered the anterior chamber spontaneously, or by easy manipulation with the lid or probe, I only irrigated the lips of the wound, omitting the intra-ocular injection altogether, or making it very slight. If much of this antiseptic is injected, it occasions considerable irritation, burning and pain for from nine to fifteen hours, yet I have never seen it cause any inflammation. When blood, pigment, or small granular and flaky remnants of cataract render the pupil and iris dull I syringe them out with Panas' solution. This procedure is easy, and has a surprising effect. As an example, case No. 87 may be cited:

Dr. C., æt. sixty-three, suffering from glycosuria, but being otherwise in good health. After the cataract was removed and the iris reduced, the pupil and anterior chamber contained an unusual amount of iris pigment. On syringing it out the escaping liquid looked like a blackish emulsion. The pupil and chamber became entirely clear. He had intense pain for fifteen hours, but then he was completely free from it. Healing undisturbed; $V = \frac{20}{30} +$.

The abundance and easy separation of iris pigment in this and similar cases may find its explanation by Dr. Kamocki's anatomical researches of diabetic eyes.[1] The uveal cells became enlarged and dropsical, the whole layer is thickened and contains cyst-like cavities. (See the drawings on plates II. and III.)

I have used no other *antiseptic* than the solution of

[1] See his paper in the present number of these ARCHIVES, p. 41.

Panas; not that I consider it superior to all others, but because I am not particular in the choice of these means as long as they do not irritate. I would just as gladly use the mercuric bichloride, or a very weak solution of nitrate of silver, or properly diluted chlorine water, had I a tendency to experiment with remedies. Since I began to use Panas' solution and the precautions described in my previous paper, I have performed one hundred and fifty-nine extractions, and lost only one eye (the case of suppuration, No. 22, in my previous paper), in a patient suffering from diabetes and dacryo-cystitis purulenta. In ophthalmic surgery, now as before, I lay the greatest stress on smooth operating, which means to create no condition favoring the multiplication of bacteria. There are, more or less, germs in every conjunctiva, and we cannot destroy them if we do not destroy important tissue elements. These germs, however, will not multiply as long as the organ is healthy, but they multiply if bruised and necrosed particles, or serous and sanguinolent transudations prepare for them a suitable nutrient soil. The vitality of bacteria, and in most species also their quantity, play an important part concerning the full development of their action. We know that the resistances of a healthy organism to most bacterial invasions are great—certainly to the invasion of a moderate quantity of pyogenic germs. If truly virulent staphylococci, when they are cautiously (*i. e.*, without too much bruising of cornea and wounding of iris and lens) injected into the anterior chamber, disappear without a trace; if the same microbes, injected into the veins, cause suppuration only when there is a weak point in the body, for instance a fracture, it is clear to everybody, even to those not familiar with Metschnikow's phagocytes, that the healthy body possesses the means of successfully resisting many a microbian invasion, and that in our particular case an eye, correctly operated on, is not doomed to destruction if a few microbes lodge in its conjunctival sac or get into the wound. I may here recall some experiments which I published in these ARCHIVES two years ago, viz., that out of six inoculations of truly virulent staphylococci into the same cornea, only one devel-

oped into a pestule; further, that an emulsion of stapylococci dropped into the conjunctival sac of rabbits, from which I immediately afterward extracted the lens with clean instruments and without using any antiseptic, produced no suppuration; whereas a small knife dipped into the same emulsion and used for extractions, produced it regularly. Are we not justified in assuming that no knife, not even the smallest and sharpest, can be thurst through a cornea without a certain degree of bruising? Prof. GAYET, of Lyons, after carefully disinfecting the eyes of his cataract patients, found, by test-tube cultivations, microbes in the conjunctival sac in seventy-five per cent. of the cases; but is he correct in saying that these germs are not all pathogenic because there was suppuration only in 6½ per cent. of the patients he operated on?

His second conclusion, being the immediate result of his very numerous experiments (two hundred and thirteen test-tube cultivations), must, however, be admitted, without reserve, and has a great practical bearing. It reads as follows: The employment of antiseptic or aseptic substances appears to have only a very slight (*bien minime*) influence on the presence of germs in the conjunctival sac; or, in other words, whatever we do, we are never sure to eliminate them from the field of eye operations.

We may fairly assume that it is impossible to make a cataract operation without setting up conditions that are more or less favorable to bacterial growth. If we further believe—and for all practical purposes nobody can refuse to believe—that there is no suppuration without bacteria, we have to act accordingly, omitting nothing that is calculated to assist in securing success. Even at the risk of repeating well known truths, I beg leave to lay down the following **general rules for guidance in our cataract operations:**

1. Keep out bacteria or wash them off by germless, unirritating liquids: boiled water, boric acid and other indifferent substances dissolved in boiled water.

[1] Gayet: Recherches expérimentales sur l'antisepsie et l'asepsie oculaires. *Arch. d'Ophthal.*, Sept.–Oct., 1887, p. 403.

2. Prevent the multiplication of germs by antiseptics: watery mercuric bichloride, or alcoholic biniodide, chlorine water, nitrate of silver, and other substances in very weak solutions.

3. Perform the operation with the utmost degree of neatness and accuracy, and with a minimum of traumatism, avoiding bruising, scratching, and tearing of any kind, so as to reduce septic conditions to a minimum.

4. Endeavor to obtain primary union by freeing the wound from all foreign substances, by perfect coaptation of its edges, and by maintaining the greatest possible immobility of the organ until the closure of the section is firm.

5. Avoid constitutional infection of the wound. It is dangerous to operate for cataract as long as the constitution of a patient is under the active influence of a specific disease; for instance, articular rheumatism, acute or chronic suppuration, syphilis, and the like. In some incurable diseases—for instance, diabetes—we must select the time when the vitality of the patient is least reduced.

All these rules are clear and have been sufficiently discussed, only in regard to the fourth I would like to make a few remarks. The endeavor to cure our patients "jucunde," that is, with as little discomfort as possible, has of late, it seems to me, been carried too far. SNELLEN sends some of his patients into the garden the first days after the operation. CHEATHAM removes the cataracts in a lecture room before the students, and immediately after lets them drive home in a country carriage, ten or more miles. MICHEL, of St. Louis, CHISOLM, and others, close both eyes with simple plaster, or even leave the eye not operated on open, allowing the patient, from the first day of the operation, to remain up and look about. There is no doubt that under all these conditions multitudes of eyes recover. It is incredible what a healthy eye can endure. But demonstrate by statistics large enough to exclude the element of chance, that such procedures are beneficial, or at least harmless, and I shall gladly remove all restraints from my patients. Suppose I extracted a cataract in the large hall of the New York University Medical College (where

gelatine plates, exposed only a few minutes, develop any number of germ colonies), and then let the patient drive home to some village on Long Island. Suppose that this patient loses his eye, as possibly he may, for, all other things being equal, the lecture room as an operating theatre and the drive to his home are certainly no guaranty of success. And suppose that he accuses me of negligence and sues me for damages, it is sure that my counsel would have some difficulty to convince every one of the twelve jurors that I could not have acted more carefully. If there is no other possibility, and the patients want to have it so, as in the case of Cheatham, then, of course, they take the risk. With regard to the court-plaster dressing and letting the patient have the partial use of his visual organ, Dr. Chisolm, in my opinion, also goes too far, surely for eyes whose cataracts have been extracted without iridectomy. The light which shines through the plaster induces the patient to wink and move his eye. Apart from that the stiff plaster is not the height of comfort. Patients with whom I have tried it, preferred the flannel bandage. If it is alleged that the flannel bandage presses on the eye and flattens the cornea, then the first rule of the classical binoculus has been disregarded by the dresser, namely, to pad up the corners of the eye and put only a little cotton on the top, so that an elastic and even pressure, free from any inconvenience, keeps the eyeball in a degree of immobility that is secured, as far as I have experience, by no other kind of dressing. In summer, flannel is too warm, and there are some restless patients who will disturb the roller. In such cases the linen gauze and cotton-wool can be kept in position by strips of adhesive plaster. This mode of bandaging, of course not new, is quite convenient, but secures the immobility less than the contentive and elastic flannel roller. The superiority of Dr. Chisolm's bandage is not borne out by his statistics.[1] Five per cent. of loss and five per cent. of V = $\frac{1}{\infty}$ is below the average success of experienced and skilled operators, to the front rank of whom, we all know, Dr. Chisolm belongs.

[1] See the paper by Dr. Belt, his assistant, at the beginning of this volume.

Of the **accidents** occurring during the operation the following should be mentioned:

1. In one case, No. 71, a small part of the periphery of the iris *fell before the knife*, and was cut off. No consequence. Pupil round, central, movable, V = $\frac{20}{70}$.

2. *Prolapse of vitreous* in five cases, Nos. 14, 24, 30, 70, 96. In four of them the iris was pressed back. All got well without incarceration, and obtained good vision.

The **wound complications,** which can be studied in detail in the foregoing tabular synopsis, may be summed up as follows:

Prolapse of the iris occurred in *twelve* cases.

In *one*, the case of suppuration by secondary infection, the iris filled the gap when the previously closed wound had re-opened.

In *four* cases the prolapse *disappeared spontaneously* in the course of some months.

In *four* others it was removed with scissors.

In *one*, produced by a hurt, it was reduced two hours after its occurrence. No reaction followed, and the pupil was clear and central.

In *two* cases the prolapse remained, but I shall remove it if, on the patient's return, it has not disappeared.

In *eight* cases the iris did not protrude, but was more or less extensively united to the scar. Slight, partial adhesions have probably occurred more frequently, but have either not been noticed, or have not been noted on account of their harmlessness.

If I still mention *three cases* in which the iris was *pressed back* by advancing vitreous, I have stated all the anomalies of position which the iris has presented. They occurred in twenty-three patients, all of whom, however, regained good sight, except the one with suppuration. This calamity was, of course, not caused by the prolapsed iris. The patient was an innkeeper, addicted to drink, and suffering both from dacryo-cystoblennorrhœa and diabetes, having from 5 % to 8 % of sugar in his urine, when he came to be operated on for his other eye, in which the operation was successful, in spite of his diabetes.

One case of suppuration in a hundred seems little enough, but it is one case too many. Since that time (November, 1886) 124 extractions have been made without a trace of suppuration, and without any serious inflammation. More or less filiform posterior synechiæ were all the reaction that occurred, and vision was good in every case.

Twenty times the presence of *iritis*, or posterior synechiæ, is noted, but there were only two cases in which the inflammation was of some intensity, leading to incomplete obstruction of the pupil. In the one the pupil cleared up spontaneously, in the other discission was made; good sight was obtained in both. Cyclitis has not occurred at all. The fact that of late not only the suppurative processes, but also the other severe forms of inflammation, irido-cyclitis, etc., have likewise became scarce, was lately mentioned by Prof. SATTLER, before the Medical Society of Prague, and is exemplified also by the present report.

After-operations.

In spite of this remarkable freedom from inflammation, the *pupillary area has not been so unobstructed as I anticipated.* As a rule, the centre of the capsule had been freely ruptured, yet only rarely did the pupil become clear enough to render a subsequent discission useless. Thus far, discission with a knife-needle has been made in fifty-four cases of the series under consideration, and will be made in others if the patients return and show that their vision can be improved. I dare say that there is no operator who performs after-operations in so large a percentage of cases as I do. The reason is, not that the primary results obtained by me are below the average, but that I am not satisfied with results that satisfy others. Most operators consider V = $\frac{20}{40}$ or $\frac{20}{50}$, even $\frac{20}{70}$, as sufficiently good, and so it is for ordinary purposes, especially in a patient who has been blind before. When, however, other patients consult us for vision so much impaired, we do not tell them: "Go home again; your sight is good enough"; but we try to raise it with glasses, and when we succeed in bringing it to $\frac{20}{20}$ or $\frac{20}{30}$, we feel sure to have essentially increased their

happiness and usefulness. It will at once be objected that the use of glasses is harmless, but an operation is never free from a certain risk. This is not only true, but some cases have come to my notice where, after a tolerably successful extraction, the sight was destroyed by suppuration following needle operations. The danger of needling is proportionate to the density and the age of the pupillary membrane. Capsules not thickened by products of inflammation, can be cut easily and without danger, be it shortly or long after the extractions. Pseudo-membranes, after iritis or irido-cyclitis, must be dealt with very cautiously. If they show a place of presumably slight resistance, a discission can be made in that place with a knife-needle, or a laceration with a double needle. In less favorable cases the safest operation is an iridectomy, comprising a part of the pseudo-membrane. For many years, and after different trials with iridotomy and other procedures, *I have preferred the excision of a piece of capsule and iris to all other methods.* I thrust a Beer's knife through the cornea and the pseudo-membrane, splitting the latter about 3 *mm* in length. Then I pass the loop of a Tyrell's blunt hook through the opening of the false membrane, draw the latter out and cut it off, together with a small piece of adjacent iris. These two operations, discission with a knife-needle (rarely with two), and iridectomy with Tyrell's hook, are the only ones I practise for secondary cataract. The first is very frequent, the second has become quite rare. Last year I made only one, in an old case. The reaction was nought, and the result brilliant. I will say nothing against other operations, for instance Wecker's iritomy; every one avoids dangers in operations to which he is accustomed. I only want to state what in my own hands has proved best.

It is needless for me to say that the after-operations have to be done with the same precautions as the primary. We must not think that a needle is a small innocent tool. If it tears and bruises it creates favorable conditions for non-specific processes, I mean simple exudative and plastic inflammations, as well as for the growth of bacteria should any have been introduced with the needle itself, or still

harbor in the eye, lying dormant after non-deleterious suppurative processes. They may also be in the system. The eye will then be a point of minor resistance where bacteria are used to settle.

In the great majority of cases the secondary division of the anterior capsule was followed by no or only very slight reaction, the patient being discharged in four or five days. In a certain number simple irritation or serous inflammation was noticed, marked by circumcorneal injection, even slight swelling of the conjunctiva and dulness of sight from diffuse turbidity of the vitreous. The iris was somewhat discolored, but adhesions did not appear nor did the capsular opening become occluded. There was pain and occasionally some increase of eyeball tension connected with it. exposure to light and cold, as every imprudence, made these cases worse. They all recovered with improved sight. Most of them got quickly well by salicylate of soda, alone or with leeches applied to the temple. In one or two, where the eyeball appeared harder, I instilled eserine, but it increased the pain, whereas atropine was well borne.

In one case (No. 41) a simple division of a wrinkled, not thickened, capsule produced an attack of *acute glaucoma*. The patient had Bright's disease and was an inveterate drunkard. The attack of glaucoma followed the division within 24 hours. +T 2 was reduced by eserine the next day, but on the third it was fully +T 2 again, the sight, $\frac{20}{70}$ before the operation, had fallen to quantitative perception of light. I made an iridectomy in the upper part, the incision posterior to the previous corneal section. The relief was instantaneous, the recovery prompt, and the sight good.

In no case the vision became worse by the secondary operation. How much the vision was increased in the single cases can be seen in the tabular synopsis, which, however, does not express the full visual gain, as in very many cases the last record taken was at the patient's discharge from the hospital, that is, on the fifth day, when the vitreous has not entirely cleared up. For the sake of comprehensiveness I will survey the cases in which discission (the only after-operation done in the present series) was performed.

The gain in sight, as is evident from the table, was very great. $V = \frac{20}{20}$ was attained in 17 cases, to which only 4 are added in which perfect sight was restored without a secondary operation [Nos. 3, 21, 50 (extraction with the capsule), 87 (removal of anterior capsule)].

The subsequent division of the capsule has, therefore, played as important a part in this series of operations, as in the former ones where iridectomy was made and the capsule opened at the periphery only. If we want to give our patients the highest degree of visual acuteness obtainable, we have, as WECKER says, either to split the capsule later, or remove a piece of it during the first operation. And in the latter case even then, I may add, the subsequent wrinkling and dotting of the posterior capsule may render a discission advisable in many cases.

Primary vision.	In cases.	Ultimate vision.	In cases.	Primary vision.	In cases.	Ultimate vision.	In cases.
$\frac{20}{40}$	2	$\frac{20}{20}$	2	$\frac{20}{200}$	18	$\frac{20}{20}$	2
$\frac{20}{50}$	7	$\frac{20}{20}$	4			$\frac{20}{30}$	6
		$\frac{20}{30}$	3			$\frac{20}{40}$	3
$\frac{20}{10}$	12	$\frac{20}{20}$	6			$\frac{20}{50}$	2
		$\frac{20}{30}$	3			$\frac{20}{70}$	4
		$\frac{20}{40}$	1			$\frac{20}{100}$	1
		$\frac{20}{50}$	2	$\frac{15}{200}$	2	$\frac{20}{40}$	1
$\frac{20}{100}$	9	$\frac{20}{20}$	3			$\frac{20}{100}$	1
		$\frac{20}{30}$	2	$\frac{12}{200}$	1	$\frac{20}{200}$	1
		$\frac{20}{40}$	1	$\frac{10}{200}$	1	$\frac{20}{200}$	1
		$\frac{20}{50}$	1	$\frac{8}{200}$	1	$\frac{15}{200}$	1
		$\frac{20}{70}$	1	$\frac{4}{200}$	1	$\frac{20}{50}$	1
		$\frac{20}{100}$	1				
					54		54

The Ultimate Visual Results

obtained, according to the last examinations that could be made, were as follows:

$\frac{20}{20}$	in	21	cases.
$\frac{20}{30}$	in	18	cases.
$\frac{30}{40}$	in	11	cases.
$\frac{20}{50}$	in	8	cases.
$\frac{20}{70}$	in	16	cases.
$\frac{20}{100}$	in	12	cases.
$\frac{20}{200}$	in	10	cases.
$\frac{15}{200}$	in	3	cases.
$\frac{10}{200}$	in	1	case.
0	in	1	case.
		100	cases.

If we classify the results in the customary manner we have: 96% of good results, 3% of moderate results, and 1% of failure.

These figures speak for themselves. It will be noticed with satisfaction that the lowest vision was $\frac{10}{200}$, and that the ominous symbol $\frac{1}{\infty}$ does not appear in this series.

Considering these results I need not say that I have continued to extract cataract according to the same method.

AN APPARATUS FOR THE DETERMINATION OF REFRACTION AND ACUTENESS OF VISION.

By Dr. FERD. PLEHN, Berlin.

Translated by Dr. J. B. McMahon, New York.

(*With eight wood-cuts.*)

THE numerous drawbacks connected with the use of the case of trial lenses in the determination of errors of refraction, attract very forcibly the attention of all who are called upon to make such examinations in large numbers. They often prove rather a trial of patience for both physician and patient, with the constant unavoidable soiling and misplacing of the lenses, their falling out of the spectacle frames, their mistiness on hot days, etc. Add to all this the want of accuracy in the glasses, and the clumsy and still costly character of the whole apparatus, and we can well understand why the perplexed ophthalmologist time and again sighs for a satisfactory substitute for his trial case.

Involuntarily his thoughts will wander to an ideal lens, provided with an arrangement for altering the focal distance, a thought to which both Snellen and Landolt have given expression.[1] Such an instrument evidently would give the *coup de grâce* to the miseries inherent in the trial case.

The Stokes lens has at least in part solved this question for cylindrical glasses, and its existence shows that the idea

[1] Handbuch der gesammten Augenheilkunde von Gräfe und Sämisch. Bd. iii., p. 79. There we read as follows: "It would be a marked advantage to possess lenses of variable strength in such a way that we might get with rapidity a greater or less refractive power which could be read off the instrument directly."

of a lens of adjustable focal distance must not be relegated to the realms of impossibility. So too with the combination of two prisms in which a complete series of prismal powers are obtained by rotation about a common axis.

As will be shown later, we may employ a combination of two convex glasses with arrangements for altering their relative position, not only to replace the entire set of trial glasses, but to supply the equivalent of any imaginable spherical lens. The same holds true correspondingly for a combination of two convex cylindrical lenses.

On practical grounds we have united the two lenses in a short, telescope-like instrument. It consists of two pieces, one sliding within the other. In each piece is fixed a plano-convex lens of 5 *cm* focal distance. The lenses have their convex surfaces turned to each other, and at first are separated the sum of the two focal distances.

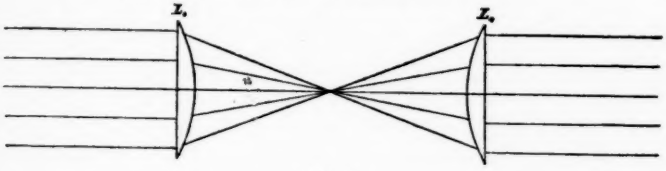

FIG. 1.

In this adjustment of the apparatus (Fig. 1), which we shall call the zero-position, rays falling upon one lens parallel to its axis, will, after passing through it, intersect at the common focal-point, and will emerge from the round lens again parallel.

In the zero-position, accordingly, the system acts upon parallel rays as a plane lens, except that the order of the rays is reversed.

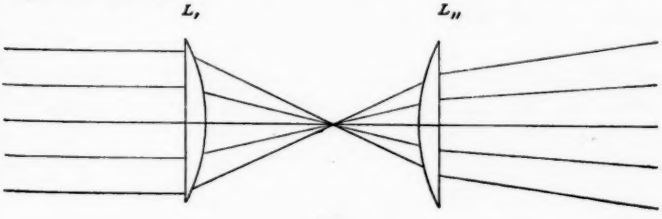

FIG. 2.

Let us now lessen the distance between the glasses, approaching the second to the first. The relations of the rays to the first lens are still the same. On emerging from it, however, the rays cross at a point between the second lens and its focus (Fig. 2). On passing through this, therefore, they are no longer parallel, but divergent; the more so, the nearer the lenses are approached to each other.

On the other hand, the opposite condition, *i. e.*, the convergence of the emerging rays, results when the lenses are separated farther apart than in the zero-position (Fig. 3).

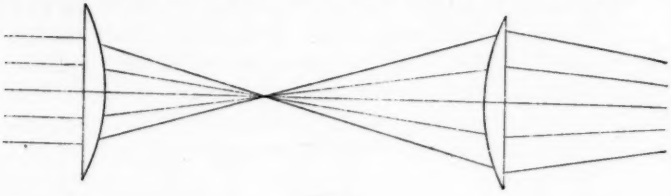

FIG. 3.

It is, therefore, easy to see that by altering the relative position of the lenses, rays entering parallel may be made to emerge with any possible degree of divergence or convergence; or, in other words, by means of such an apparatus we may obtain the equivalent of any imaginable spectacle glass.

Still, two very serious defects are attached to the instrument in this simple form. These are, first, the variability of the visual angle, and secondly, want of uniformity in the division of the scale. These drawbacks are easily remedied if we follow the directions given by Nagel[1] with reference to the adjusting of optometer lenses.

The importance of the subject demands a more than passing attention to the rules laid down by Nagel.

It requires but a moment's reflection to see that the instrument we are dealing with is nothing but a telescope having an objective and eye-piece of the same focal distance. It has accordingly been called a telescope without magnifying power. This statement, however, harbors an inaccuracy,

[1] Handbuch der gesammten Augenheilkunde von Gräfe und Sämisch. Bd. vi., p. 315, u. ff.

for only objects situated at an infinite distance are seen without enlargement through the instrument by the emmetropic eye, all others being magnified ; the less the distance, the greater the effect. The enlargement is not perceptible to the eye unless the objects are nearer than four metres. One can easily convince himself of this by vision *à double vue*. All this, however, is true only for the emmetropic. For the ametropic the conditions are again different.

This becomes at once clear if we analyze the action of the telescope.

As is well known, the objective gives an inverted image of the object, which image is viewed through the eye-piece as with an ordinary magnifying glass. The emmetropic unite parallel rays, and therefore adjust the eye-piece in such a position that the inverted image lies at its focus ; for in this case the rays which emerge from it become parallel. Myopes, requiring divergent rays, push the eye-piece in, whilst hypermetropes draw it out to obtain convergent rays.

The use of the instrument in measuring refraction rests plainly upon these variations in its adjustment (the so-called Burkhard-Badal principle). The myope, therefore, views the aërial image at shorter range than the emmetrope, the latter again nearer than the hypermetrope. Accordingly, myopes view the objects under the greatest, hyperopes under the least visual angle.

For these reasons no direct determination of visual acuteness can be made with the apparatus. We must either make a calculation for each individual case, or work out a table which would cover all possible cases. Apart from the question of the visual acuteness, however, the mere determination of the refraction would be prejudiced by this varying of the visual angle, as the seeming increase or decrease in the size of the object leads to accommodative efforts, and so masks the true refractive condition.

The gradation of the instrument is equally lacking in uniformity.

If we calculate what distances of the lenses correspond to definite equal refractive intervals, we obtain steadily increasing results. This is particularly disproportionate on the

positive side of the scale. To replace a spectacle glass of + 15 dioptries, the tube must be 25 *cm* long, for + 18 dioptries 55 *cm*, and for + 20 almost of infinite length.

We must therefore abandon the idea of replacing the stronger convex glasses by this method.

Hirschberg's optometer corresponds essentially to the above description, as it was constructed before the publication of Nagel's rules. It consists of a small telescope with an objective of 40.5 *mm* and an ocular of 27 *mm* focal distance. Hirschberg was the first to employ the astronomical telescope for optometric purposes.

The "refractometer" devised by von Graefe is a double-barreled Dutch telescope (the ordinary opera-glass). It therefore magnifies under all circumstances, but in different degrees, according to the refractive condition of the eye. Moreover, it has oculars of three kinds, which makes its employment much more difficult.

Let us now, on the other hand, follow Nagel and place the instrument before the eye in such a way that its nodal point coincides with the focus of the ocular, and we obtain not only a scale short and uniformly graded, but also a constant visual angle for all conditions of refraction.

The instrument is so arranged very simply, either by having the tube project over the eye-piece 38 *mm* or, much preferably, by fitting upon the ocular extremity of the tube a cap of that length, provided with a round central opening.

From Fig. 4 it is seen directly that the object is viewed under the same visual angle in all conditions of refraction when the ocular is placed before the eye in the above-described position. The objective has been omitted from this and the following figures for the sake of brevity.

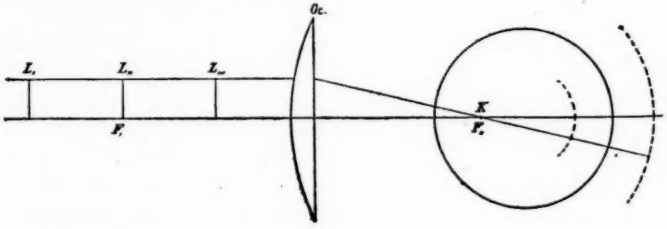

FIG. 4.

Oc is the ocular, F_{II} its posterior focal point, coincident with *K*, the nodal point of the eye. $L_I\, L_{II}\, L_{III}$ are the inverted images at different distances from *F*, the anterior focal point of the lens. The dotted lines indicate the retina of a hyperopic and a myopic eye.

The use of the cap produces a still more marked change on the scale gradation. Equal displacements of the lens correspond to equal differences in refraction. In the present case (the lenses having a focal distance of 5 *cm*) an alteration of the distance between the lenses of 2.5 *mm* corresponds exactly to a dioptrie. Taking + 20 D and − 20 D as the limits of the scale, its whole length is 10 *cm*. The instrument thus gains also in handiness.

The proof of this equidivision of the scale we give as follows, after Nagel.

In Fig. 5 let *R* signify the actual far-point, and R_I the same brought nearer by the lens. At R_I is the inverted image of the test letters. F_I is the anterior, F_{II} the posterior focus of the lens. *C* is its principal point. *K*, the nodal point of the eye, coincides with F_{II}. Represent the distance *RK* by *r*, and R_IK by r_I. We have now to find an expression in the given quantities for the distance $F_I R_I$, which, as can be seen, measures the displacement of the lens from the zero-position.

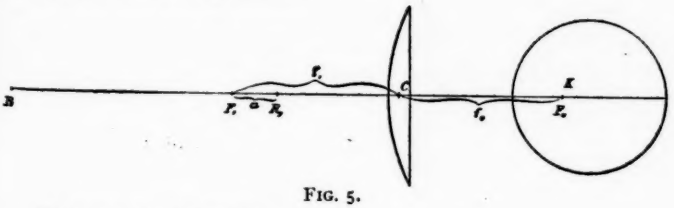

FIG. 5.

This we obtain as follows:

The two points *R* and R_I are conjugate foci of the lens *Oc*.

$$\therefore \frac{1}{f} = \frac{1}{R_IC} - \frac{1}{RC}$$

For R_IC can be substituted $r' - f$.
" RC " " $r - f$.
" $r_I - f$ " " $f - a$.

$$\therefore \frac{1}{f} = \frac{1}{f-a} - \frac{1}{r-f}$$

$$(f - a)(r - f) = f(r - f) - f(f - a)$$

Expanding, we get $fr - f^2 - ar + af = fr - f^2 - f^2 + fa$.
This reduced gives $ar = f^2$

$$a = \frac{f^2}{r}$$

Let us consider $\frac{f^2}{r}$ made up of the two factors f^2 and $\frac{1}{r}$. Now the expression $\frac{1}{r}$ represents at the same time the refraction of the eye and the glass needed for correcting the error of refraction (supposed to be placed at the nodal point of the eye). Substituting for $\frac{1}{r}$ successively 1, 2, 3, etc., dioptries, we obtain for the corresponding values of a: f^2, $2f^2$, $3f^2$, etc.

The unit for the division of the scale is thus found to be f^2, which in the present case is 2.5 *mm*. If we move the lens this distance from the zero-position, the instrument produces the same effect on parallel rays as a spectacle-glass of 1 dioptry, *i. e.*, having a focal distance of 1 metre. A furthur displacement of 2.5 *mm* gives the equivalent of 2 dioptries.

This scale applies also, however, when the focus of the lens is made to coincide with the anterior focus or with the principal point of the eye. In the first case the instrument shows what glass placed at the anterior focus of the eye would make the eye emmetropic.

As, in practice, glasses are ordinarily worn at about the anterior focus of the eye, this arrangement of the instrument is to be preferred to the other two. In adopting it, however, we reject the much more important advantage of having a constant visual angle.

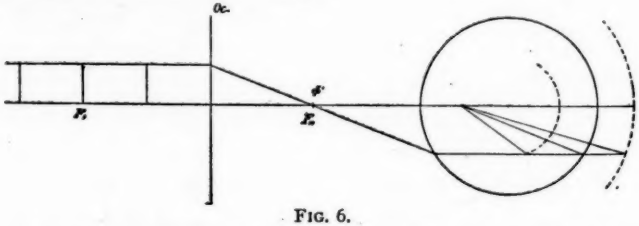

FIG. 6.

If we make coincide the focal point of the lens and of the eye, the object viewed is with different visual angle under different

conditions of refraction, although in all the three conditions the retinal images have the same size. Fig. 6 shows this.

This last property might well be of value under certain circumstances.

The other adjustment, *i. e.*, with the focal point of the lens at the principal point of the eye, is, however, of no advantage whatever.

A third arrangement, in which the principal point of the lens coincides with the anterior focal point of the eye, has been adopted by Landolt and Loireau for their optometer. It also gives retinal images of the same size under different refractive conditions, but does not allow of a uniform scale-division. If, instead of the arrangement with the nodal point of the eye and the focus of the lens coinciding, we choose to adopt one of the three others, the instrument may be provided after Seggel's example with a sliding cap.

Seggel's optometer is based upon the old Burow's instrument. This latter is a tube closed with ground-glass, in which a much diminished photograph of Snellen's test-types is placed. This is viewed from the other end of the tube through an adjustable lens.

Seggel has improved the instrument by adopting the arrangement of Nagel. Further, he provides it with a second tube which, however, terminates in a blind extremity. But this alteration does not remove the force of the objection, raised originally against the old instrument of Burow, viz., that it does not supply an exact method for determining refraction, as the person under examination accommodates involuntarily, controlled by the idea that he is to distinguish objects sharply inside a short closed tube. No such misimpression comes into play in the case of the telescope. The party examined understands that he is expected to fix his gaze on a distant object, and so involuntarily relaxes his accommodation. The small inverted aërial image situated within the instrument does not come within his cognition.

For these reasons we choose to adopt the arrangement with the focus of the lens at the nodal point of the eye.

There still remain a few points for brief consideration.

As may be remembered, the zero-position of the instrument was defined such that the vertices of the two lenses were distant from each other exactly the sum of their focal distances. In this position, it is true, rays entering parallel, also emerge parallel. However, rays coming from any

point of the test-types, which are placed 4 to 6 metres distant, are not parallel but slightly divergent, as they fall upon the objective. The aërial image formed by the objective, therefore, is not situated at the common focus of the two lenses, but a little nearer the eye-piece (a difference of 0.5 *mm* when the test-types are 5 metres distant). The rays, therefore, after their last refraction, do not emerge parallel from the objective, but slightly divergent. If we wish to have absolutely parallel emergent rays, the distance between the lenses must be increased by the distance which separates the inverted aërial image from the focus (0.5 *mm*). The image and the focus of the ocular now coincide, and we again have parallel emergent rays.

It would be certainly more exact so to adjust the zero-point that the emergent rays produced backwards would intersect at the point from which they originally proceeded.

They would then fall upon the eye after passing through the instrument with the same divergence as if the object were viewed with the unassisted eye.

The error dependent on this is, however, so slight that it may be disregarded.

We distinguish in the instrument the absolute and the relative zero-position. The former holds for parallel, the latter for divergent rays. In the former, the vertices of the lenses are separated by the sum of their two focal distances. In the latter, the distance between the two is such that after the last refraction the emergent rays, if produced backward, would intersect at their point of origin.

If the relative adjustment is disregarded, the absolute being employed for divergent rays also, these latter, after refraction, will appear to proceed from a point which lies nearer than their point of origin by four times the focal distance of the lens used in the instrument. The use of the absolute zero-position, therefore, means an approximation of the object viewed 4 *f*.

The proof is as follows :

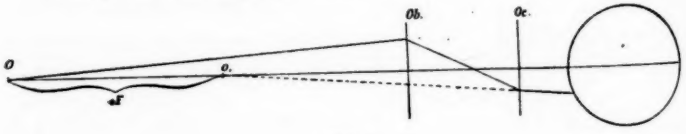

FIG. 7.

Let E be the distance of the object viewed, O, from the principal point of the ocular ; f', the distance from O to the principal point of the objective ; f'', the distance from the principal point of the objective to the conjugate focus of O ; φ', the distance of this point from the principal point of the ocular ; finally, φ'', the conjugate distance of φ' for the ocular lens. The value of φ'' is expressed in the formula :

$$\varphi'' = \frac{\varphi' \; F}{\varphi' - F}$$

$$\text{But } \varphi' = 2\,F - f''$$

$$f'' = \frac{f' \; F}{f' - F}$$

$$f' = E - 2\,F$$

By substitution of these values, the first equation gives

$$\varphi'' = \frac{F^2 \, E - 4 F^3}{-F^2} = -(E - 4\,F).$$

The negative sign merely indicated the direction in which φ'' is to be measured from the principal point of the ocular lens. The absolute value of φ'' is, therefore, as follows :

$$\varphi'' = E - 4\,F.$$

If now the test-types are placed at a distance of 5 metres, the instrument, when used in the zero-position, causes an apparent approximation of the tests to the extent of $4\,F = 0.2$ metre. The instrument, in this case, acts like a concave lens of 120 metres' focal distance ($= +0.008$ D). When the test-types are 4 metres distant, it acts as a concave lens of 76 metres' focal distance ($= +0.013$ D). These quantities can be disregarded without more ado.

On the other hand, if one desires to utilize the optometer for near work, the relative zero-position must be determined for each separate distance. Under these circumstances the scale generally takes another form.

There is so much the less necessity for anxiety over this point, as the sources of error in using the best glasses for the determination of refraction are far more numerous and important.

For the same reason we leave out of consideration the magnifying of the test-types. By computation or, more directly, by vision *à double vue*, it is readily seen that the error is exceedingly slight for a distance of the test-type of over 4 metres; indeed it is scarcely discernible by the eye,

provided only the nodal point of the eye coincides with the focus of the ocular.

Let γ represent the size of the retinal image of a distant object G. They are to each other as their distances from the nodal point of the eye. Let φ'' represent the distance of the nodal point from the retina ; E, the distance of the object G from the nodal point. Then

$$G : \gamma :: E : \varphi'' \quad (1).$$

If the object is viewed through the apparatus by an emmetropic eye, the ratio of G to its inverted aërial image, which we shall call g, is the same as that of their respective distances from the principal point of the objective. Or,

$$G : g :: f' : f'' \quad (2).$$

This ærial image bears again the same proportion to its retinal image γ' as the the focal distance of the lens to φ''. So,

$$G : \gamma' :: F : \varphi'' \quad (3).$$

Multiplying proportions (2) and (3) and reducing, we obtain

$$G : \gamma' :: f' F : f'' \varphi'' \quad (4).$$

Let us now divide (4) by (1), substitute for f'' its value $\frac{f' F}{f' - F}$ and clear of fractions, and we obtain

$$\gamma : \gamma' :: f' - F : E.$$

When the test-types are 5 metres distant, $E = 5$ *m*, and $f' - F = 4.8$ *m*. The enlargement of the retinal image is, therefore, $\frac{5}{4.8} = 1.04$.

Having finished these discussions, we may now pass to the practical application of the instrument.

Use of the Apparatus to Determine Refraction and Visual Acuteness.

In the practical application of the instrument, exactly the same rules hold as in the ordinary determination of refraction with trial glasses.

The main rule is, therefore, to allow the patient under no conditions to adjust the apparatus.

This would lead to about the same results as if the trial case were to be entrusted to him for the selection of a glass.

The apparatus may either be held in the hand, or, what is far preferable, be mounted on a stand on the exact level of the patient's eye.

Before beginning the examination we should set the instrument at the zero-position, and so direct it toward the test-types that they may appear in the middle of the field. In testing the vision, any of the ordinary visual tests may be employed. One must see, however, that the lines are not too far apart, for, otherwise, the upper or lower lines will lie near the edge of the field and lose in distinctness, on account of spherical aberration.

As for the test-types, they are to be placed at a distance of at least 4 metres, in an inverted position and well illuminated.

When all these directions have been carried out, the patient is to cover one eye with the hand, and to look with the other through the instrument. The cornea of the patient must not be more than 5 *mm* distant from the aperture in the cap. This is generally attained by having the supra-orbital region rest against the apparatus.

The patient is then asked to read the test-letters aloud, beginning with the largest. If he reads them all smoothly, he is either emmetropic or hyperopic, to decide which the instrument is fixed at + 1 D by means of the adjusting screw. If he still can read the same as before, it is altered to + 2 D, and so on. The highest positive adjustment with which he continues to read the same, gives the degree of hyperopia, measured with reference to the nodal point of the eye.

The acuteness of vision is shown directly by the number of the line read.

If, on the other hand, the patient does not read so well with the convex as with the zero-position, he is emmetropic.

If the patient is myopic and has been able to read, for example, as far as the third from the smallest line, we turn to the weak concave adjustments and try successively stronger negative adjustments till no further improvement of the vision results. The weakest negative adjustment with which it is possible to get this most distinct vision, gives the degree of the myopia.

The determination of the range of vision is equally simple.

The near point for emmetropes and myopes is given from the strongest negative adjustment with which it is possible to read without diminution of the visual acuteness. In hypermetropes we get it by trying successively weaker positive then stronger negative adjustments. The last adjustment at which the patient sees distinctly, determines the near point.[1]

Determination of Astigmatism.

If, instead of the spherical lenses, we employ in the apparatus two plano-convex cylindrical lenses of 5 *cm* focal distance, it can then replace all the cylindrical test-glasses. In this case, however, we must confine ourselves to the use of radiating lines or concentric circles for visual tests. The instrument must also admit of rotation on its long axis, to allow of the determination of the direction of the meridians.

We must then determine that adjustment of the apparatus with which the gray sectors disappear, and all looks equally sharp and black. Beyond this, the rules already given above are to be followed.

In the absence of the cylindrical lenses, it is yet possible to utilize the instrument in the determination of astigmatism, if we but provide the cap with a slit-shaped instead of the round aperture. The refraction of each meridian is then measured in the usual way.

Use of the Apparatus as a Refraction-Ophthalmoscope.

Let us imagine the background of the eye illuminated at the moment when the determination of the refraction with the instrument has been completed, and follow the course of the rays proceeding from the macula. We shall find that these intersect within the instrument, and after their final refraction converge to a point of the visual tests. Consequently, they leave the objective almost parallel.

If now an emmetropic observer places his eye before the objective, these rays will be brought to a focus on his retina,

[1] In this way, it is the relative and not the absolute range of accommodation that is determined.—K.

and he will obtain a distinct image of the background of the eye.

To illuminate the fundus of the eye, we remove the ordinary cap and attach another, bearing on its free extremity a mirror, which rotates on its vertical axis. This is used to throw into the eye of the individual examined the image of a flame which lies to one side.

It must be remembered that the mirror, the light, and the two eyes must be all in the same plane.

With the instrument mounted on a stand (an upright) it is quite easy to fix the fundus. The free-handed use of the apparatus requires more practice.

The picture one sees is an inverted one, formed by the ocular and viewed through the objective as with an ordinary magnifying glass.

As this lies some 45 *mm* deep in the tube, it is impossible at this end of the instrument to have the focus coincide with the nodal point of the eye. We cannot, therefore, aim at having a constant visual angle, but this in ophthalmoscopic work has no significance. It is very easy, however, to make the focus of the lens coincide with the principal point, or the anterior focus, of the eye: in the former case the eye is brought close to the opening; in the latter, it is kept some 13 *mm* distant.

After what we have said, the manipulation of the instrument should prove easy. The apparatus is so directed towards the eye under examination that the red reflex from the fundus becomes visible. The screen is now turned in the one or other direction until the details can be made out. For the more delicate adjustment, the same rules are to be followed as in the usual determination of refraction.

When the proper adjustment has been ascertained, the refraction of the eye under examination may be read directly from the instrument.

If the examiner is ametropic, the degree of his ametropia must be taken from the result, as the instrument gives the total of the examined and examining eyes. Instead of this, the observer may correct his ametropia previous to the examination. Fig. 8 shows the course of the rays when both

eyes are emmetropic. The instrument is then adjusted to the zero-position.

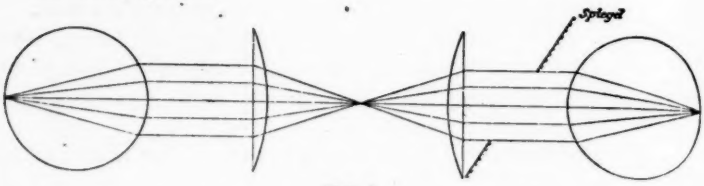

FIG. 8.

It would probably be advisable to adopt lenses of shorter focal distance in employing the instrument with the ophthalmoscopic mirror, on account of greater ease in handling.

We feel that we have already laid down sufficient proof that the instrument acts as a lens of adjustable focal distance for rays that are exactly or nearly parallel. The conditions are somewhat changed, however, when we have to deal with divergent rays, as, for example, in testing near vision. Although, as can be easily seen, it is possible to obtain with the apparatus rays of any degree of convergence or divergence, it is less adapted for testing near vision, because, first, there is an unavoidable enlargement of the test-types, which vitiates the results, and, secondly, a separate scale is required with each change in the distance of the tests.

On these grounds we would not for the present employ the apparatus for near objects. It is, further, entirely sufficient to know the far- and near-points of an eye in ordering any kind of spectacles.

The single or double instrument, with or without stand, may be procured from Schmidt & Haensch, Berlin, Stallschreiberstrasse 4.

SMALL ORBITAL OSTEOMA SUCCESSFULLY REMOVED WITH THE CHISEL.*

By H. KNAPP.

At the beginning of Dec. '87 a boy of thirteen years of age, L. G., of this city, was brought by his physician to the Dispensary of the New York Ophthalmic and Aural Institute, on account of a swelling in the inner-upper corner of the left orbit. This abnormity had been noticed for two months, caused no discomfort, but had been steadily increasing. Under the skin, just behind the orbital margin, at the inner-upper corner, I felt a tumor, the size of a cherry-stone, of marble hardness, slightly uneven surface, immovably connected with the roof of the orbit. On palpation, its posterior limit could be ascertained. The integrity and unrestricted mobility of the eyeball bore evidence to the absence of another growth deeper in the orbit.

I entertained no doubt about the osseous nature of the growth, but thought it possible that the tumor might proceed from the frontal sinus. Yet the perfect freedom from cerebral symptoms, *e. g.*, headache, fretfulness, irritability, or depression, as well as constriction at the base of the tumor, made it appear probable that the growth was limited to the orbit, and moreover that its base, as in the majority of tumors of this description, was cancellous. This supposition determined the plan of the operation.

Dec. 3, '87, under ether anæsthesia, a curved incision of 2 *cm* was carried through the skin and subcutaneous tissue down to the bone. The growth was explored with the finger. A second cut went through the periosteum, exceeding the whole length of the tumor by 2 *mm* on each side. The periosteum was detached from the tumor with a small gouge all around. The denuded osteoma

* Read before the Ophthalmological and Otological Sections of the N. Y. Academy of Medicine. Feb., 1887.

was then grasped with a pair of tooth forceps, held by an assistant. A small straight chisel, the cutting edge of which was no more than 2–3 *mm* broad, was applied to the base of the tumor. During the hammering it was directed away from the growth, and obliquely toward the frontal sinus. The first strokes with the ox-hide mallet discovered the cancellous structure of the base, and it did not require many strokes to detach the little tumor, as a whole, like an unbroken cyst, from its surroundings. The frontal sinus had not been opened.

When some bruised shreds of tissue had been cut off, and the hemorrhage was completely arrested, the whole round cavity was washed out with an alcoholic solution (Panas') of biniodide of mercury, and carefully closed with a continuous silk suture. The wound was covered with gauze and absorbent cotton, over which a flannel monoculus bandage was passed so as to exert gentle pressure and secure immobility of the eyelids. The patient was put to bed, had to lie quiet on his back, the other eye covered, except when he ate or had to satisfy calls of nature. I need not say that the operation was done under antiseptic precautions, with careful disinfection of the region of the wound, the instruments, hands, and sponges.

The result was recovery by primary union without any febrile disturbance. The skin of the region of the wound was not red, but a painless swelling of the subcutaneous tissue, limited to the previous seat of the tumor, could be felt for two or three weeks, then it completely disappeared. The suture was removed on the tenth day; it was perfectly clean, and no liquid oozed from its holes in the skin.

This was the easiest removal of any exostosis I have ever made. It confirms a lesson which I learned in previous cases, *i. e.*, never to delay operating an osteoma of the orbit or its neighboring cavities. These tumors, almost without exception, have a steady growth. It is commonly easy and harmless to remove them, as long as they are of limited size, say up to a large English walnut if their seat be the roof of the orbit or the frontal sinus, and more if they are located in the nasal passages or the malar antrum. When they have a large base at the roof of the orbit, or come out of the frontal sinus in a considerable mass, and in the course of years have caused exophthalmus or sloughing of the eye-

ball, or a portion of them can be felt under the skin above the eyebrow, near the root of the nose, their removal has invariably proved fatal, and I do not know whether modern surgery with all its antiseptic safeguards and its brilliant achievements, not to say results, in intracranial operations, would score many successes in such attempts.

In dealing with these tumors not only in the orbit but also in the ear canal, there is a rule upon which I have laid stress for years, and which our secretary, Dr. J. A. Andrews, has also emphasized in his exceedingly valuable and exhaustive paper on osteomas of the orbit and its neighboring cavities,[1] namely, not to attack those hard tumors at any point, but chisel them out of their connection by operating on their bases. The first example of such an operation is the famous case of Maisonneuve, which he called "subperiosteal removal." The osteoma in his case lay, however, more or less loose in the nasal passages, a common and favorable condition when these tumors occur in the pneumatic cavities around the orbit.

A very instructive, though not very satisfactory, case has just been published by Dr. Karl Grossmann, of Liverpool,[2] in which the patient refused the operation several years ago, and returned to the doctor only when the tumor in its growth had pressed forward and destroyed one eye, while a similar smaller growth, springing likewise from the inner-upper corner of the orbit, threatened the other eye. Dr. Grossmann, by long and tiresome drilling with a dental engine removed the projecting portion of the tumor, "as large as half a plum," and then another still flatter tumor which was behind the first. The operation lasted two hours and a half. The patient made a good recovery, and left the hospital on the twelfth day. A small drain had been left in the wound for more than six weeks, "but there was very little discharge, and the eye had very nearly resumed its normal position." A year later, when the patient was seen again, "the tumor seemed to have stopped growing. The exostosis in the other eye showed a very small increase in size."

[1] *The Record*, 1887, p. 261.

[2] *Ophthalmic Review*, Dec., 1887, p. 341.

KERATITIS BULLOSA.

By C. W. TANGEMAN, Cincinnati, Ohio,

ASSISTANT TO THE CHAIR OF OPHTHALMOLOGY AT THE MEDICAL COLLEGE OF OHIO.

THIS disease, though not of very frequent occurrence, has been described by a number of observers in the last century. Cases have been observed and reported from time to time, and the subject has received considerable attention, experimentally, at the hands of Prof. Leber, and yet the etiology of this disease is quite obscure. The scarcity of clinical material has made it difficult to study the affection with any degree of satisfaction. Experiments on the eyes of animals have yielded but few data, except to disprove the erroneous theory of Landesberg, who advanced the idea that the formation of vesicles on the cornea is purely mechanical, caused by a force from behind, as in increased intra-ocular pressure. It is now definitely fixed that, no matter how great the intra-ocular pressure, the fluid in the anterior chamber does not cause œdema of the cornea, or is not permitted to pass through the membrane of "Descemet" unless the surface be broken. In a large number of the reported cases of "keratitis bullosa" there was neither increased intra-ocular pressure nor inflammation of the uveal tract recorded.[1] Saemisch makes an infiltration of the parenchyma of the cornea the first stage in this disease. He says that all the difference there is between parenchymatous infiltration of the cornea and keratitis bullosa is that in the latter, some time during the course of the disease, there is a formation of large vesicles, larger than phlyctenular vesicles, and not so round or regular in shape. Graefe,[2] when making a microscopic examination of the anterior wall of the described vesicle, finds that not only the epithelial layer, but also the anterior elastic membrane and some fibres from

[1] Graefe and Saemisch: *Handb. d. Ges. Augenhk.*
[2] Graefe: *Arch. Ophth.*, ii., 1, 206.

the parenchymatous layer of the cornea, is separated to make up the covering of the vesicle. Possibly the smallest number of cases would show an involvement of the cornea to that depth. Usually, as Schweigger[1] states, he never *found* that more than the anterior epithelial layer was separated in this disease. Bullous keratitis must be differentiated from the various forms of vesicular keratitis or herpes cornea, which may occur without any previous inflammatory disturbance. It is safe to say that we have to deal with a separation of the superficial layer only in all of these various forms of inflammation; the contents are the same, but the condition of the cornea and the circumstances under which each form is developed are different. Warlemont, McKenzie, and others have described this disease as dropsy of the cornea,—a formation of vesicles or blebs, due to an escape of fluid from the anterior chamber through the corneal tissue. While this theory has been disproven, nothing satisfactory has been substituted. Since a few cases have been reported of keratitis bullosa in glaucomatous eyes, the tendency has been to connect the etiology of the two diseases. Degenerative changes of the epithelial cells, causing an enlargement of the intercellular spaces, has most recently been advocated as the chief process that is going on in the corneal tissue, which looks so much like a parenchymatous inflammation of the cornea. Michel reports cases where he observed the formation of vesicles quite large on a cornea otherwise perfectly healthy.

The patient that came under the writer's observation at Prof. W. W. Seely's clinic is of special interest, since the vesicles appeared on both eyes simultaneously, and on an otherwise perfectly healthy cornea.

Mr. B., æt. thirty, laborer, white, robust and healthy, complained of a disturbance of his sight. Since the past week he had suffered acute attacks of pain, which seemed to get better one day and worse the next. A careful examination of his eyes showed three or four vesicles on each cornea, quite large, filled with a clear fluid. The patient said he had had previous attacks of a similar nature, and he had seen "blisters" form on the sight,

[1] Schweigger: Handbuch, 1873.

that would pass away again. The cornea showed distinct traces of an apparently superficial abrasion. Aside from these changes nothing abnormal could be found about the cornea. The chief complaint was an intense burning sensation and some redness of the ocular conjunctiva. The tension was normal, and the depth and contents of the anterior chamber looked natural. The patient was not suffering from any constitutional affection, but gave a distinct malarial history or tendency.

On the second day later, he presented himself again, and some new bullæ had formed. The patient was now put on large doses of quinine, with the effect of removing all symptoms of irritation, and preventing a recurrence of the vesicles on the cornea. The patient was kept under observation for some time, but there was not even a tendency to a return of the symptoms above recorded.

Here, now, we have a case of a rare disease, carefully watched, with an intermittent tendency, being absolutely cured upon the administration of an antiperiodic. Does this indicate any thing? Graefe, Schultze, Saemisch, and others have recorded cases with distinct periods of intermission, but fail to speak of the possibility of malaria having any etiological connection with this affection. In the above case all of the diseases usually given as causative of vesicular keratitis, viz., glaucoma, iritis, ichthyosis, inflammation of the uveal tract, degeneration of the corneal epithelium, corneal infiltration and enlargement of the intercellular spaces, engorgement of the lymph spaces, increased intra-ocular pressure, or a mechanical force, were absent. Hansen some time since described a case of intermittent vesicular keratitis, but insists that it was caused by trauma to the corneal epithelium.

How these vesicles should occur on the cornea due to malaria is difficult to say, yet it would be no more impossible than when they follow vaso-motor disturbances (Michel), or when we have a serous effusion into the vitreous (Seely[1]), or, finally, in the case reported by Perlia,[2] where the formation of the vesicles was due to vaso-motor changes[3] caused by migraine.

[1] Transactions of the Amer. Ophth. Soc., 1883.
[2] Zehender: *Monats. Bl.*, 1888.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY DURING THE SECOND QUARTER OF THE YEAR 1887.

By H. MAGNUS, Breslau; C. HORSTMANN, Berlin; and A. NIEDEN, Bochum.

WITH THE CO-OPERATION OF

C. E. Fitzgerald, Dublin; E. Marckwort, Antwerp; P. von Mittelstädt, Metz; Dantone, Rome; Hirschmann, Charkow; S. M. Burnett, Washington; Schjötz and Ole Bull, Christiania, etc.

Sections I.–V. Reviewed by Prof. H. MAGNUS.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

a.—TEXT-BOOKS, MONOGRAPHS, TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS.

142. Barkan. Expert medical report on 158 inmates of the Institution for the Deaf and Dumb and Blind, at Berkeley. *Trans. of the Med. Soc. of the State of California for the years* 1886–1887.

Barkan (142) finds that in 36 cases of binocular blindness, the following affections were the cause: blennorrhœa neonatorum in 25 %, congenital blindness in 22.22 %, cerebral affections in 11.11 %, unknown affections in 11.11 %, conjunctivitis granulosa in 8.33 %, spinal meningitis in 2.77 %, malaria in 2.77 %; small-pox in 2.77 %, rheumatism in 2.77 %, syphilis in 2.77 %, toxic influences in 2.77 %. In regard to the health of the members of the family to which the blind belonged, Barkan makes the following statement: Father and mother insane, 1 case; sister blind, 2 cases; brother deaf and dumb, 2 cases; brother and sister paralyzed, 1 case; related in the third degree, 1 case.

b.—STATISTICAL PAPERS.

143. EYE AND EAR CLINIC OF THE MIAMI MED. COLLEGE, Cincinnati, 1887.

144. PFLÜGER. Ophthalmic clinic of Berne University. Report for the years 1884–1886.

145. SCHREIBER. Fourth annual report for the year 1886. Magdeburg, 1887.

146. UTRECHT. Nederlandsch Gasthuis voor behoeftige en minvermogende voglijders. *Acht-en-Pwintigste*, Verslag 6, Juni, 1887.

At the MIAMI COLLEGE EYE CLINIC (143) 970 cases were seen. Operations: 2 extractions, 7 iridectomies, 2 enucleations.

BURNETT.

PFLÜGER (144) treated, from 1884 to 1886, 3,201 patients in the dispensary, and admitted 1,202 into the clinic. Operations upon the lens, 142—132 with good, 5 with moderate result, 5 failures. Total number of operations performed, 887.

SCHREIBER (145) treated 1,594 patients, and admitted 148 into the clinic. Number of linear extractions, 14, thirteen of them with good result, one failure; 8 extractions, 19 extirpations of the lachrymal sac.

In UTRECHT (146), 2,777 patients were treated.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

a.—GENERAL PATHOLOGY.

147. JAVAL. Sur l'ophthalmométrie pratique. *Soc. franç.*, May, 1887.

According to JAVAL (147), there are three kinds of corneal astigmatism. 1. The vertical meridian has the smallest radius of curvature; this is the most frequent kind. 2. The horizontal meridian has the smallest radius of curvature. 3. The principal meridian is inclined at an angle of 45°. In cases of the first sort the corneal astigmatism of young persons is usually corrected by astigmatic contraction of the lens; in cases of the second sort the corneal astigmatism is generally more than doubly corrected by astigmatic accommodation; this is the most frequent cause of complaint of astigmatic persons. In cases of the third sort we must endeavor to find the axis of the glasses which correct the decentration of the eye. Javal recognizes only that determination of the astigmatism which is made with Javal-Schjötz's ophthalmometer, wherein he is opposed by Wecker. MARCKWORT.

b.—GENERAL DIAGNOSIS.

148. BOUCHERON. Sur la notation horaire de l'astigmatisme. *Soc. franç. d'ophth.*, May 2, 1887.

149. BULL, GEO. J. Optometrie rapide. *Soc. franç. d'ophth.*, May 2, 1887.

150. CUIGNET. Images kératoscopiques. *Rec. d'ophth.*, 1887, No. 5.

151. TSCHERNING. Ophthalmométrie. *Soc. franç. d'ophth.*, May 2, 1887. Simplification of Javal's ophthalmometer.

152. ZIENINSKI. De la détermination du degré de l'amétropie par la rétinoscopie. *Rec. d'ophth.*, 1887, No. 5.

ZIENINSKI (152) recommends retinoscopy for the objective determination of refraction, a method which thus far has received a different name from almost every author. Cuignet, the inventor of this method, calls it keratoscopy; Galezowski, dioptroscopy; Landolt, pupilloscopy; Parent, retiniscopy; Chibret, sciascopy; and Zieninski the above-mentioned name. The method is based on the varying displacement of light and shadow on the retina in the different kinds of refraction, the source of light being a plane or concave mirror. In England and America this method has found adherents, but not in Germany, while in France, where it was invented, it seems to be practised by only a few oculists.

c.—GENERAL THERAPEUTICS.

153. GAYET. Asepsie oculaire. *Soc. franc. d'ophth.*, May 4, 1887.

154. KLEIN. Remarks on the formation of a pupil for optical purposes. *Centralbl. f. d. ges. Therapie*, 1.

155. SEGAL. On exenteration of the globe. *Protokolle d. Kaukasischen med. Gesellsch.*, 1887, No. 14.

156. STOCKER. On the influence of mydriatics and myotics on the intraocular pressure under physiological conditions. *v. Graefe's Arch. f. Ophth.*, vol. xxxiii., 1, p. 104.

GAYET (153) took the conjunctival secretion from all his patients (102) for a month and made cultures. In 79 cases he obtained a positive result, though the conjunctival sac had previously been washed out twice daily. He found staphylococcus aurens and albus. Nevertheless, the operations performed on this infected territory gave good results, and Gayet asks why in-

fection did not take place. Probably every thing that causes a movement of liquid into the eye from without favors infection. The method of operating, therefore, very likely has a great influence on the development of infection. MARCKWORT.

KLEIN (154) defends the iridectomy for optical purposes in zonular cataract.

HOLBECK performed exenteration of the eyeball in conjunction with SEGAL (155) in 7 cases of chronic iridocyclitis and panophthalmitis of traumatic origin. The course of healing was favorable in all, its duration two to three weeks; the reaction was very slight. The stump was freely movable and well adapted for wearing an artificial eye. Segal, therefore, would confine the indications for enucleation to tuberculous affections or neoplasms of the eye. In all other cases he would prefer exenteration.

HIRSCHMANN.

STOCKER (156) found that in animals under the influence of curare atropine slowly diminishes the intraocular pressure under physiological conditions. Cocaine also reduces the intraocular pressure about 2 to 3 *mm*, preceded in the majority of cases by a slight increase. Eserine primarily increases the pressure in the physiological eye; there is no primary reduction of the tension. The increase is followed by a reduction greater than the primary increase. Pilocarpine slowly reduces the tension in the physiological eye, after previously disturbing it for half an hour, accompanied with general excitement. During the period of varying pressure there is an increase of the mean tension in both eyes. Stocker, therefore, comes to the following conclusions: the action of the pupil stands in no causal connection with the increase or decrease of the intraocular pressure.

III.—INSTRUMENTS AND REMEDIES.

157. VALK, F. An improved ophthalmoscope. *N. Y. Med. Rec.*, April 23, 1887.

VALK'S (157) improvement consists in an arrangement by which the disc of lenses can be turned by means of a button which is moved up and down on the handle of the instrument (devised by de Wecker 16 years ago. Ger. re.). BURNETT.

158. BONO. Della coffeina come analgesico locale in oculistica. *Ann. di ottalm.*, vol. xvi., 1.

159. MAKLAKOFF. Notice sur la valeur du péroxide d'hydro-

gène comme remède thérapeutique et diagnostique. *Arch. d'ophth.*, No. 3.

According to the investigations of BONO (158) coffeine is a very effective analgesiac. It does not produce anæsthesia in the strict meaning of the word, but soon causes the pain to cease produced by instruments and caustics, not only on the cornea and conjunctiva, or other mucous membranes, but also on the cutis. A 2 % solution suffices. DANTONE.

MAKLAKOFF (159) highly values the peroxide of hydrogen, especially because the nascent oxygen penetrates into the interstices of the tissue so that the remedy may be regarded, so to speak, as an interstitial antiseptic. When, after the removal of a foreign body, the author dropped some peroxide of hydrogen upon the corneal wound, the picture of a hypopyon at once appeared, connected with an ulcer by a thin white line. The phenomenon was caused by the entrance of the oxygen in form of minute bubbles into the corneal tissue, soon disappeared, and could be easily reproduced. As the remedy thus reveals small superficial defects of tissue, the author considers it of diagnostic value also. Since he has used it in serpent corneal ulcers, he asserts that he has not been obliged to resort to Saemisch's operation even in the most desperate cases, and refers for his results to statistics which are to appear later. v. MITTELSTÄDT.

IV.—ANATOMY.

a.—GENERAL AND COMPARATIVE ANATOMY.

160. HAENSELL. Méthode pour conserver les préparations macroscopiques du bulbe oculaire. *Bull. de la clin.-ophth. nat. de l'hosp. des quinze-vingts*, vol. v., No. 2, p. 79.

161. LEBEJDEN. Cystoid coloboma. *Wjestnik ophth.*, vol. iv., No. 3.

162. STÖHR. Handbook of histology and microscopic anatomy of man, including microscopic technique. Jena, 1887.

HAENSELL (160) embeds sections of the eyes for preservation in glycerine-glue, according to the method of Nettleship and Priestley Smith. This glue the author prepares according to the directions of Gerlach. After adding albumen, boiling and filtering, the mass, which previously had been turbid, becomes clear and gradually solidifies. For the detailed directions for preparing and embedding, see the original.

Univ of M

LEBEJDEN (161) describes a case of bilateral anophthalmus with the well-known cysts under the lower lids in a child a year and a half old.

STÖHR (162) presents in the tenth chapter of his book a short but very instructive account of the histology of the eye, with directions for preparing microscopic specimens of the various parts. The reviewer has found the book very useful and earnestly recommends it.

163. JESSOP, WALTER H. Abstracts of lectures on the intra-ocular muscles of mammals and birds. *Ophth. Rev.*, May–June, 1887.

JESSOP (163) denies the existence of a dilator of the pupil. According to him the division of the ciliary muscle into longitudinal, radiating, and circular fibres, first advanced by Iwanow, cannot be strictly maintained, the direction of the fibres being dependent upon the shape of the eyeball and the position of the ciliary body.

b.—ORBIT.

164. ELLIS, F. W. The circulation of the blood in the orbit studied by means of the plethysmograph. *Boston Med. and Surg. Jour.*, April 21, 1887.

ELLIS (164) has designed an instrument, which he calls the plethysmograph, by means of which he can measure the pulse-curves with the greatest delicacy. He has determined by means of this apparatus that the pulse-curve of the orbit is the same as that of the brain. BURNETT.

c.—CENTRAL ORGAN.

165. FOREL. Some reflections and conclusions on the anatomy of the brain. *Arch. f. Psych.*, vol. xviii., p. 162.

FOREL (165) thinks that the optic fibres ramify in the corpus geniculatum externum, where they end, and that here a new system of fibres takes its origin in the ganglion-cells and terminates in the visual sphere.

V.—PHYSIOLOGY.

a.—GENERAL PHYSIOLOGY.

166. ANDREWS. The electric light as an illuminator. The effect of strong light on the eye. *Trans. Amer. Ophth. Soc.*, vol. xxii., annual meeting.

167. FIEUZAL. Les verres gris-jeunes et les mouvements des éléments rétiniens. *Bull. de la clin.-nat. ophth. de l'hosp. des quinze-vingts*, No. 2, 1887.

168. HOLDEN. Simple methods of finding the axis of a prism. *Amer. Journ. Ophth.*, May, 1887.

ANDREWS (166) considers the arc-light injurious, the incandescent, however, the ideal light.

More than seven years ago FIEUZAL (167) prescribed yellow glasses instead of blue or smoke glasses in cases of photophobia and hyperæsthesia of the retina, and always found that the patients preferred the former. Fieuzal has now had made grayish-yellow glasses (a mixture of yellow, blue, and gray), which he claims satisfy all the demands of the hygiene of the eye. The physiological explanation of their action is found in the investigation of van Genderen Stort on the changes in position after illumination of the elements of the visual layer, according to which yellow light does not influence the cones, their position remaining unchanged, while green light provokes the most extensive movements. The author recommends these glasses, which can also be used in form of spherical or cylindrical glasses or goggles, in all cases of retinitis, choroiditis, and photophobia, but also as a protection against bright sunlight. Green glasses should be avoided, but might be indicated in cases of torpor of the retina.

V. MITTELSTÄDT.

HOLDEN (168) turns the prism until both of the images of a degree are united in one unbroken line; this line indicates the direction of the axis of the prism.

b.—RETINA.

169. HERING. On the theory of simultaneous contrast of Helmholtz. First communication. The experiment with the colored shadows. *Arch. f. d. ges. Physiol.*, 1887.

170. TREITEL. On the nature of the disturbance of the sense of light. *v. Graefe's Arch. f. Ophth.*, vol. xxxiii., 1, p. 31.

171. TREITEL. On normal adaptation, *v. Graefe's Arch. f. Ophth.*, vol. xxxiii., 2, p. 73.

172. WERTHEIM. On the number of visual unities in the middle portion of the retina.

HERING (169) thinks that the phenomenon of simultaneous contrast need not be explained on a physiological basis, but may be

considered as due to alternating action of the portions of the retina affected.

TREITEL (170) shows that Wolffberg has not determined an anomaly of the cause of light with his method, but only that functional disturbance which is the essential feature of hemeralopia. We can only speak of a diminution of the sense of light, when the power to recognize difference in brightness has been impaired. Hemeralopia, however, is an affection in which all the functions of the sense of sight, those of space, color, and light, have been pathologically diminished, the absolute illumination being reduced.

c.—COLOR-PERCEPTION.

173. DOBROWOLSKY. On the causes of erythropsia. *v. Graefe's Arch. f. Ophth.*, vol. xxxiii., 2, p. 213.

174. HOOR. Tests for color-blindness in the royal army and navy. *Militärarzt*, 1887, Nos. 10 and 11.

175. HOOR. The quantitative test of color-perception of Dr. Louis Wolffberg. *Militärarzt*, 1887, No. 7.

176. RUDALL. Color-blindness and other defects of sight in some of their medico-legal aspects. Melbourne, 1887.

DOBROWOLSKY (173) found that the maximum dilatation of the pupil is necessary to produce the phenomena of erythropsia in the whole field of vision, or its greater portion. In an eye with narrow pupil, erythropsia can only be produced with certainty when the sun is gazed at. But even in this case, the erythropsia is confined to the point of fixation and its immediate neighborhood. This difference is explained by the fact that when the pupil is dilated the light can spread itself over the entire retina, or the greater part of it, while when the pupil is narrow only a sharply defined image of the sun is formed. Dobrowolsky also noticed "violet seeing" during his experiments, and explains it by saying that it is the negative after-image of those rays which come from the edge of the sun, and are dispersed over the fundus. It would therefore be more correct to substitute for erythropsia the more appropriate expression, "violet seeing."

HOOR (174) recommends Stilling's plates, but is not satisfied with having them read, but also asks the patient to point out the letters.

HOOR (175) has found that Wolffberg's method has but limited value for the military physician, and that the question of fitness or unfitness for service cannot be accurately determined by it.

d.—MISCELLANEOUS.

177. LANGENDORFF. On monocular and binocular closure of the lids. *Arch. f. Anat. u. Physiol.*, 1887, p. 144.

LANGENDORFF (177) found both the pupillary and the blinking reflex confined to one eye in the rabbit, while in man both eyes were always affected. This depends upon the incongruity of the visual field in the divergent eyes of the rabbit, while in man the visual fields coincide. There must, therefore, be intercentral fibres in man of the facial nerve, which controls the closure of the lids, connecting the visual centres in the cortex. In the rabbit there are probably no such fibres.

178. STEINACH. Studies on the comparative physiology of the reaction of the pupil. *Centralbl. f. Physiol.*, 1887, No. 5. Animals with partial decussation in the chiasma possess direct and consensual reaction of the pupil. In animals with total decussation, the pupillary reflex is confined to the eye examined.

Sections VI.–X. Reviewed by DR. HORSTMANN.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

179. COHN, H. Medical supervision of the schools for preventing the spread of myopia. Rev. fr. the vi. internat. hygienic Cong. at Vienna. Vienna, 1887.

180. COLEMAN, W. F. The use of a convex cylinder in simple myopic astigmatism of low degree. *Jour. Am. Med. Ass'n*, May 28, 1887.

181. JAVAL, PARENT, MARTIN. Notation de l'astigmatisme. *Soc. franç. d'ophth.*, 1887.

182. MARTIN, G. Croissants de la pápille et contractions astigmatiques. *Ann. d'ocul.*, vol. xcvii., p. 166.

183. RANNEY, AMBROSE L. Eye-strain in its relation to neurology. *N. Y. Med. Jour.*, April 16, 1887.

184. STILLING, J. Investigations on the development of myopia. Wiesbaden, 1887. J. F. Bergmann.

185. VESZELY, CARL CONSTANTINE. The genesis of myopia. *Wiener med. Wochenschr.*, 1887, No. 35.

According to COHN (179), myopia increases from one grade of school to the other, in proportion to the increased demands upon the eye. It should not be treated with indifference, and strict

measures should be adopted to prevent it. In the majority of cases it is caused or at least increased by long-continued near-work, especially under poor illumination. It is particularly incumbent upon the school to avoid every thing which may contribute to the development of myopia. Special attention should be given to the illumination, the construction of the benches, the print of the school-books, to the writing and the blackboard, to the wearing of glasses, and the overtaxing of the eyes. It is desirable that a physician should examine the sight and refraction of every child on admission, this examination to be repeated at the beginning of each term.

COLEMAN (180) recommends the use of a convex cylinder with its axis at right angles to that of the correcting concave glass, for near vision. The very evident propriety of this procedure in certain cases in which it is desired to relieve the accommodation, and the great frequency with which it is done, would, it seems, render a special article on the subject unnecessary. BURNETT.

On May 2, 1887, a commission was appointed by the Société française d'ophthalmologie for the purpose of devising some uniform system of notation of astigmatism, cylindrical glasses, optometer, etc. In the report of the commission PARENT (181) proposes for both eyes an identical, not symmetrical, notation, by determining the trial-glass for the patient in the direct sense, *i. e.*, that the zero-point should be situated on the right hand of the patient when the scale is on the lower half of the frame, and on the left of the patient when it is on the upper half. Landolt does not agree with the commission, but suggests a symmetrical notation, by placing the zero-point on the median line and then counting to the left and right. The addition of the letter "n" indicates an inclination of the upper end of the meridian to the nasal side, the letter "t" an inclination to the temporal side. Landolt and Meyer are therefore added to the first commission, but as no agreement can be reached between Javal, Parent, and Martin on one side and Landolt and Meyer on the other, a definite decision is postponed until next year. The method recommended by Javal, Martin, and Parent agrees with the American, and that of Landolt and Meyer was recommended by Knapp years ago (see these ARCH., vol. xv., p. 209). MARCKWORT.

MARTIN (182) endeavors to show that the posterior staphyloma is the result of the astigmatic contractions of the ciliary muscle. The direction of the crescent is always parallel to one of the

principal meridians, generally the one of least curvature. Among 358 cases of astigmatism according to the rule (vertical), Martin found 336 external and only 22 lower crescents. Among 24 cases of astigmatism contrary to the rule (horizontal), all had vertical crescents. Among 22 cases of oblique astigmatism, there were 15 perpendicular and in 7 crescents parallel to the corneal astigmatism. Among the whole number of 413 cases, the crescent was therefore parallel in 384 to the astigmatic contraction of the ciliary muscle, *i. e.*, in 93 per cent. of all cases. (The hypothesis is refuted by the author's own numbers.—K.) MARCKWORT.

RANNEY (183) has been making partial tenotomies of the ocular muscles, after the method of Stevens, for two years, in cases of nervous disease where insufficiencies were found. He is enthusiastic in its praise, and asserts that many cases of epilepsy, neurasthenia, neuralgia, chorea, and hystero-epilepsy have been relieved by the procedure. BURNETT.

STILLING (184) has tried to bring the question of the genesis of myopia nearer to its solution, both from the anatomical as well as from a clinical point of view. After discussing the various theories, he first gives an anatomical examination of the eye, considering, especially, the superior oblique muscle and its action. From a further series of fifty cases Stilling shows that the action of the muscles has a marked influence on the shape of the eyeball. In this respect the superior oblique plays an important part, as its course and insertion is very variable, that of the other muscles very constant. The development of the crescent is due to the action of the superior oblique, increased by that of the recti muscles, and the prolongation of the globe or increased curvature of the cornea respectively is also due to the action of the muscles. Stilling has also subjected 10 myopic eyes to a careful examination; in 6 of them an orbital section could also be obtained. The refraction of 7 of these during life was known (5 had a myopia of 10 D or more, 2 of 5 D). The antero-posterior diameter of the eyes with a moderate degree of myopia, either did not differ from that of the normal eye, or at least did not exceed it by more than 1½ *mm.* The temporal portion, however, was larger than the nasal; the sclera had not become thinner. The highly myopic eyes were enlarged in every diameter, without exception. In some the nasal, in others the temporal portion was the larger. In the former, the superior oblique extended diagonally or straight across far over on the temporal side; in the latter, the tendon did not

reach beyond the median line. The sclera had become thinner, the vitreous was more or less destroyed, the sheath detached from the optic nerve, the intervaginal space dilated, and the papilla displaced. The choroid had undergone extensive changes, the pigment had disappeared from large areas, not only in the pigment-layer, but also in the stroma; the layer of rods and cones had become atrophic around the papilla, also the two granular layers.

There are therefore two anatomically distinct forms of myopia; the one being essentially a change in the form of the otherwise normal eyeball, with a normal or only slightly elongated axis, a normal sclera, a normal intervaginal space and vitreous; the other showing a marked distension of the whole eyeball, causing atrophy of the choroid, and adhesion between the latter and the retina and sclera around the optic nerve. The papilla is not only displaced, but also somewhat pulled apart and thereby enlarged. The two forms of myopia have only the kind of refraction, the shape of the ciliary muscle, and the crescentic form of the conus in common. The one is due to slightly increased longitudinal growth under muscular pressure, the other to a dropsical degeneration of the eye. The ordinary crescentric conus is of no pathognomonic value, but the opposite is true of the large ring-shaped one. The former belongs to the first form, the latter to the second. The former can be produced by near-work, the latter is a disease of the eye. The former is not followed by the evil consequences many hygienists assume. It is a harmless deformity, which does not materially affect the function of the eye.

The last chapters contain historical remarks on myopia and concave glasses.

Veszely (185) also asserts that the superior oblique plays an important part in the development of myopia.

VII.—LIDS.

186. Benson, A. The operative treatment of trichiasis, with or without entropion, and a short note of Argyll Robertson's operation for ectropion. *Brit. Med. Jour.*, 1887, No. 1,378.

187. Holmes, E. L. Chancre of the eyelid. *Jour. Am. Med. Assoc.*, April 23, 1887.

188. McKeown. Spasmodic entropion. New method of treatment. *Brit. Med. Jour.*, 1887, No. 1,378.

189. Trélat. Ectropion cicatriciel, autoplastic. *Rec. d'ophth.*, 1887, No. 4, p. 193.

BENSON (186) recommends the operation according to Argyll Robertson.

HOLMES (187) reports one case in which a man received a burn on the eyelid, which subsequently, in some manner unexplained, became infected. The ulcer, as well as the general symptoms, disappeared promptly under specific treatment. BURNETT.

To overcome spastic entropium of the lower lid, MCKEOWN (188) passes a suture through the middle of both commissures, allowing them to remain six days in position, and keeping the edges of the lids in contact for that length of time.

VIII.—MUSCLES AND NERVES.

190. AMIDON. Two cases of insufficiency of the superior rectus muscle, with distressing symptoms permanently relieved by prisms. *N. Y. Med. Rec.*, April 23, 1887.

191. CHISOLM, J. Congenital paralysis of the sixth and seventh pair of nerves in an adult. *Arch. f. Augenhk.*, vol. xvii., p. 414.

192. RAMPOLDI. Assenza congenita ereditaria dei movimenti oculo-palpebrale. *Ann. di ottalm.*, vol. xvi., 1, p. 51.

In both of AMIDON'S (190) cases there was at first observation insufficiency of the interni, and the deficiency of the superior rectus was not discerned until later. There were in both cases severe nervous symptoms, pain, vertigo, vomiting, etc. One was relieved by a prism of 3° base in over the right eye and 2° base up over the left eye, in conjunction with a correction of the presbyopia. The other case, an astigmatic, was relieved by placing the prisms obliquely, thereby correcting both the inward and upward deficiency, 4°, 160°. BURNETT.

RAMPOLDI (192) saw in a brother and sister complete absence of the movements of the eyes combined with ptosis. In the young man the eyes and sight were normal, but in the girl vision was poor; the field, however, intact. The ophthalmoscope revealed a physiological excavation and a lateral exit of the blood-vessels from the papilla. The condition was congenital, and the father was similarly affected. DANTONE.

IX.—ORBIT AND NEIGHBORING CAVITIES.

193. BAASNER, N. Case of fracture of the medial wall of the orbit and of the ethmoid cells. *Münchener med. Wochenschr.*, 1887, No. 18.

194. BETTMAN, BOERNE. Ocular troubles of nasal origin. *Jour. Amer. Med. Assoc.*, May 7, 1887.

195. JEFFERY, G. C. An anomalous experience during the enucleation of an eye ball. *N. Y. Med. Times*, April, 1887.

196. SWANZY, H. R. A case of fibro-sarcoma of the orbit. *Ophth. Rev.*, 1887, vol. vi., No. 69, p. 185.

197. ZEHENDER, W. A case of echinococcus in the orbit, with remarks on the occurrence of this disease in Mecklenburg. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxv., p. 333.

198. ZIEM. Disturbance of sight after application of the galvano-cautery in the nasal cavity. *Centralbl. f. prakt. Augenhk.*, 1887, p. 131.

BAASNER'S (193) case was that of a man aged 42, who had been injured about the head in 1871. Five years later, exophthalmus of the right eye with diplopia developed, which increased from year to year. At the inner canthus a tumor became visible. After incision a defect of the medial wall of the orbit and a loose piece of bone were discovered. The latter was removed and drainage-tubes were inserted, whereupon the exophthalmus gradually disappeared.

BETTMAN (194) reports six cases of epiphora with attendant conjunctivitis accompanying nasal troubles,—hypertrophy of the turbinated bones, polypi, etc.,—which were completely relieved by a removal of the nasal trouble. BURNETT.

In JEFFERY'S (195) case the whole orbital tissue and lids became infiltrated with blood after the section of the nerve in enucleating an atrophied globe. Such an accident has happened to the reporter, but they seem to be very rare. BURNETT.

SWANZY (196) removed a fibro-sarcoma which filled the whole of the left orbit, and had been gradually growing for four and a half years. The eyeball was dislocated upwards under the stretched and enlarged upper lid. The tumor was removed without difficulty, and the boy made a good recovery. The microscopic examination showed a predominance of the fibrous over the sarcomatous structure. FITZGERALD.

ZEHENDER (197) extirpated in three sittings an echinoccocus from the orbit of a man aged 38. It had caused exophthalmus and diplopia; the former condition disappeared after the operation, while the latter improved.

ZIEM (198) observed in three cases temporary disturbances of vision after cauterization of the nasal mucous membrane. Ophthalmoscopically nothing abnormal.

X.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

199. DE BENEDETTI. La profilassi della blenorrhœa congiuntivale dei neonati. *Boll. d'ocul.*, vol. ix., 8–9, p. 65.

200. BENSON, A. Cases of tumor of conjunctiva and cornea. *Ophth. Rev.*, 1887, vol. vi., No. 69, p. 189.

201. BONO. Un nuovo metodo operativo per corregere molti casi di simblefaro. *Ann. di ottalm.*, vol. xvi., 1, p. 46.

202. COPPEZ. Ophthalmie diphthéritique chez un enfant de dix jours. *Soc. franç. d'ophth.*, 1887.

203. GAYET. Ophthalmia neonatorum. *Prog. méd.*, 1887, No. 23.

204. KARWETZKY. The question of the fight against trachoma among the military. *Russkaya Med.*, 1887, No. 21.

205. KUCHARSKY, J. Bacteriological remarks on trachoma. *Centralbl. f prakt. Augenhk.*, 1887, p. 225.

206. LOPEZ. Note sur le ptérygion. *Rec. d'ophth.*, 1887, No. 4, p. 223.

207. MOURUAN. Traitement du trachome conjunctival par la cauterisation. *Thèse de Paris*, 1887.

208. RAEHLMANN. The etiological connection between pannus and trachoma. *v. Graefe's Arch. f. Ophth.*, vol. xxxiii., 2, p. 113.

209. SCELLINGO. Sarcoma melanotico della congiuntiva. *Boll. d. R. Accad. med. di Roma*, vol. xiii., 5.

210. SCHMIDT, E. The micro-organisms of trachoma and some other mycotic diseases of the conjunctiva. *Inaug. Diss.*, St. Petersburg 1887.

211. WEEKS, J. E. The pathogenic microbe of acute catarrhal conjunctivitis. *N. Y. Med. Rec.*, May 21, 1887.

BENSON (200) describes a case of recurrence of fibroma of the cornea, which was much smaller and flatter than the original tumor. He also removed a melanotic growth from the conjunctiva close to the corneal margin, which was 8 *mm* long and 3 *mm* wide.

In operating for symblepharon, BONO (201) divides the adhesions as usual, detaches the conjunctiva, reunites the wound in the lids, but in closing the wound on the globe does not cut one of the threads of the last suture in the fornix, but passes it through the lid to the outer surface, draws it tight, and in symblepharon

of the upper lid fastens it on the cheek, of the lower lid, to the brow. The raw surfaces opposite each other, which may still exist, are thus kept apart, thereby diminishing the probability of reuniting. DANTONE.

COPPEZ (202) reports a case of genuine diphtheritic conjunctivitis in a child 10 days old, and advises the use of citric acid as recommended by Fieuzal. MARCKWORT.

GAYET (203) discusses blennorrhœa neonatorum, the cause of which he finds in Neisser's gonococcus, which enters the eye during the passage of the head through the vulva.

KARWETZKY (204) warmly recommends pressing out the trachoma-granules, followed by an irrigation with a solution of corrosive sublimate. He presses out the granules partly with the fingers, partly with a forceps. HIRSCHMANN.

According to the investigations of KUCHARSKY (205), trachoma is an affection of the conjunctiva sui generis, as the same micro-organisms occur in the granules with special biological and morphological differences. The pathogenic qualities of these micro-organisms have, however, not yet been demonstrated. The micro-organism found by Michel, which morphologically consists of micrococci, possesses nothing characteristic. The coccus found by the author in the trachoma-granule grows on solid nutrient soil at a temperature of 30–35° C. in shape of white readily confluent spots, which form a membrane which can be drawn out in threads; meat peptone-gelatine is always liquefied. By transferring this culture to pigeons, rabbits, cats, dogs, and man, true trachoma could not be produced, but by transferring the contents of the trachoma-granule to the conjunctiva of the cat, granulations similar to those of trachoma developed. Trachoma and follicular catarrh are identical processes from a bacteriological point of view.

LOPEZ (206) observed 9.29 % of pterygium among all his eye-patients on Cuba. The whites seemed most disposed to this disease. MARCKWORT.

According to RAEHLMANN (208) pannus in trachoma is neither of traumatic origin, nor does it pass to the cornea from the mucous membrane of the lids and globe over the limbus. It is an independent disease, which in the majority of cases coincides with trachomatous conjunctivitis; it manifests itself as a peculiar localization of trachoma on the cornea.

SCELLINGO (209) removed from a person aged 33 a melanotic

sarcoma the size of a pea, which had developed on the tarsus of the left upper lid. DANTONE.

SCHMIDT'S (210) dissertation contains a more detailed exposition of the paper of the reviewer on the trachoma-coccus previously published and herein reviewed, besides new investigations on the microbes found in epidemic catarrh, phlyctenular conjunctivitis, blennorrhœa of the new-born and adults, croupous and diphtheritic conjunctivitis, and those found on the normal conjunctiva. In regard to the trachoma-coccus, the author comes to the following conclusions: 1. Trachoma is a mycotic disease. 2. The trachoma-coccus of the author seems to be identical with that of Sattler. Michel, on the contrary, has not examined a pure trachoma form, but probably one combined with blennorrhœa. 3. In shape and position, the trachoma-coccus greatly resembles the staphylococcus pyogenes, from which it differs (*a*) by its greater size, (*b*) lesser mobility, (*c*) greater tenacity of the cultures, which liquefy gelatine but slowly. The trachoma-cocci are sometimes arranged in chains. 4. The development of cultures on blood-serum and agar-agar is indicated by the appearance of gray or milk-white spots of viscid consistence, which appear in shape of foci along the track of the infecting needle. 5. The cultures grow much more rapidly at a temperature of 36°–38° C. 6. In birds (pigeons) it is easy to produce trachoma from cultures of the coccus. In mammals the infection succeeds only after several attempts repeated at longer intervals. 7. The trachoma-cocci can be found in all the layers of the conjunctiva, as well as the subconjunctival tissue. Epidemic catarrh is due, according to the author, to the presence in the conjunctival sac of a pathogenic micro-organism, which in shape and manner of growth is identical with the staphylococcus pyogenes albus. It does not seem to penetrate into the depths of the tissues. In phlyctenular conjunctivitis, Schmidt was able to cultivate five different varieties of microbes. The results of inoculations with them were negative. In blennorrhœa he found Neisser's gonococci characteristically embedded in the protoplasm of the cells. But in the cultures, the gonococcus loses its characteristic form and size, and may then easily be mistaken for other diplococci, as Bumm mentions (the smaller ones resemble the trachoma-cocci, the larger ones the sarcinoids). The gonococcus can be most easily (perhaps even exclusively) cultivated on blood-serum. In the cultures it is soon destroyed by other micro-organisms. In croupous conjunctivitis, Schmidt found whole groups of diplo-

cocci in the protoplasm of the pus cells and around the nuclei of destroyed cells. When stained with gentian-violet they can be recognized with great distinctness, while vesuvine tinges them but slightly. In size they correspond to large gonococci, but the characteristic flattening of each half was absent. They could not be cultivated. Based on investigations of himself and others, the author ascribes xerosis of the conjunctiva to the entrance and proliferation of a specific bacillus in the superficial epithelial layer. The affection may also spread to the cornea, at least in adults. This bacillus of xerosis has two vegetative forms: that of the bacilli and that of the cocci. The author did not succeed in observing the change from cocci to bacilli. That the cocci were derived from the bacilli was clearly shown by cultures. Inoculations did not succeed.

The author mentions also the following, not pathogenic forms of micro-organisms, which he found in the secretion of diseased as well as healthy conjunctivæ: lemon-colored sarcina, two forms of bacilli, micrococcus prodigiosus, white sarcina, staphylococcus flavus. Experiments on the influence of several antiseptic substances in common use on the vitality of these pathogenic micro-organisms gave the following results: a solution of sublimate, 1:8,000 (possibly weaker ones also), a two-per-cent. solution of carbolic acid, iodoform in a ten-per-cent. glycerine-emulsion, kill all the pathogenic microbes described by the author in five minutes. A one-per-cent. solution of carbolic acid has the same effect on all pathogenic forms, with the exception of the trachoma-coccus. Weaker solutions of these substances, or a four-per-cent. solution of boric acid, do not affect the vitality of these microbes in the least after an action of five minutes' duration.

This paper of WEEKS (211) may be considered supplementary to his article on the same subject in these ARCHIVES, vol. xv., No. 4. He offers additional cases and some practical conclusions as regards treatment. He finds that the microbe does not develop below 30° C., and he finds, by actual experimentation, that the temperature of the conjunctival sac can be reduced to 30° C., provided the lids are but little swollen. BURNETT.

212. ABADIE, CH. Nouveau traitement du kératocone. *Arch. d'ophth.*, vol. vii., 3, p. 201.

213. CANT, W. J. On the treatment of conical cornea by the actual cautery. *Brit. Med. Jour.*, 1887, No. 1,384, p. 174.

214. GALEZOWSKI. Les hémorrhagies de la cornée et de leur diagnostic differentiel. *Rec. d'ophth.*, 1887, No. 4, p. 201.

215. GILLET DE GRANDMONT. De la kératite trabéculaire. *Rec. d'ophth.*, 1887, No. 5, p. 323.

216. MERTEN, H. Contribution to the treatment of purulent keratitis. *Inaug. Diss.*, Berlin, 1887.

217. NEESE, E. The behavior of the epithelium in the healing of linear wounds of the cornea, and wounds with the lance-shaped knife. *v. Graefe's Arch. f. Ophth.*, vol. xxxiii., 1, p. 1.

218. TROUSSEAU, A. Sur l' étiologie de la kératite interstitielle. *Soc. franç. d'ophth.*, 1887.

219. VALUDE. Ablation d'un staphylôme chez une malade arrivée à la dernière periode de la phthisie. *France méd.*, 1886, p. 1,690.

Instead of excising a narrow crescentric strip from the cornea, as Galezowski does for keratoconus, ABADIE (212) burns a deep furrow with the galvano-cautery at the upper edge of the cornea, without penetrating into the anterior chamber. This method is certainly easier than that of Galezowski. The clinical results, which are said to be very good, are reported in the dissertation of one of his scholars. (Du kératocone et de son traitement par la cautérisation ignée périphérique.—Dr. Guiot, 1887.)

v. MITTELSTÄDT.

GALEZOWSKI (214) reports two cases of hemorrhage into the cornea. They were observed in a woman aged 40, in an eye with absolute glaucoma, and in a young man aged 19, as the result of an injury. That the blood was in the cornea and not in the anterior chamber was proven by the fact that the iris was visible behind it, that it did not change its position with inclinations of the head, and that there was no horizontal upper boundary line.

MARCKWORT.

GILLET DE GRANDMONT (215) describes as "trabecular keratitis" an inflammation of the cornea, characterized by more or less marked gray streaks and lines. These lines are sometimes parallel, sometimes radiating or intersecting; they begin in the centre of the cornea with a very fine line, and gradually spread out peripherically to the limbus. According to Gillet de Grandmont, these streaks are the normal canals of the cornea, which only become visible when abnormally filled. This form of keratitis must not be confounded with the one resulting from micro-organisms, and also having a stellate appearance.

MARCKWORT.

Of 58 patients at the ophthalmic clinic of the University of

Berlin suffering with purulent keratitis, 23 were treated with medicinal remedies, and 35 with the galvano-cautery. According to MERTEN (216) phthisis bulbi occurred in 2 cases among these, adherent leucoma in 12, total posterior synechiæ in 5, in 7 the result remained unknown, and 32 were cured, with maculæ of larger or smaller size. The indication for the galvano-cautery was given by an affection of the lachrymal sac, and in those cases in which the suppuration could not be checked with medicinal remedies.

NEESE (217) fond that, an hour after the cornea had been cut through with a linear or lance-shaped knife, the epithelium at the margin of the gaping wound ended with a sharp edge. After four hours it had covered the whole thickness of the edges of the wound; after 6 to 10 hours it passes in several layers down along the edges of the wound, and after 12 hours has reached the middle of the entire extent of the latter. After 15 hours it has passed this point, and a bridge is formed with two epithelial proliferations lying side by side. In the next 24 hours the epithelium is raised, and after 48 hours the whole upper half of the wound is filled with it, and the level of the cornea is almost reached. As the middle layers of the cornea do not gape after the section, while the upper and lower ones do, the epithelium cannot go any deeper. An upper and a lower funnel are therefore formed while the middle lamellæ unite. The karyokinesis is most active during the fourth hour in a large extent around the wound. In the tenth hour it is less marked, and the karyokinetic figures have lost their zonular arrangement. In the twelfth hour, karyokinesis in the epithelium of the wound itself is first observed. After 24 hours, the karyokinetic process has come to an end. The middle layers of the cornea, as already stated, remain in contact and are united by the liquid oozing from the parenchyma. The upper funnel is closed by the epithelial proliferation mentioned above, the lower by a coagulated plug. The wound remains in this condition for about two days. Then numerous round cells are formed, especially at the edges of the wound. They must be regarded as coming from the fixed corneal cells. On the fifth day the swelling of the corneal parenchyma diminishes. The round cells assume an oval shape. Fibrous metamorphosis and retraction of the newly formed connective tissue exert a pressure upon the epithelial plug, which gradually degenerates. The upper funnel is filled with new connective tissue at the end of two weeks. The epithelium over the wound does not differ any longer from the neighboring healthy epithelium.

TROUSSEAU (218) found that among forty cases of interstitial keratitis thirty-seven were affected with hereditary syphilis; he also usually observed the characteristic teeth. Great mortality of the children, or frequent abortions, were common in these families. Abadie agrees with Trousseau in general, and recommends subcutaneous injections of mercury. But even when this treatment was adopted Wecker saw the other eye become affected. Abadie and Wecker made the observation that in late years the cases of interstitial keratitis were more severe than formerly. According to Haltenhof, more than half of all the cases of bilateral interstitial keratitis can be traced to hereditary syphilis; even acquired lues gives rise to this ocular affection more frequently than is generally assumed. Poncet, Javal, and Landolt saw interstitial keratitis result from malarial cachexia. MARCKWORT.

Sections XI.–XVIII. Reviewed by DR. NIEDEN.

XI.—IRIS.

220. PANAS. Tuberculose de l'iris. *Journ. de méd. et chir. prat.*, p. 210, May, 1887.

221. QUERENGHI. Irite plastica destra guarita coll' injezione ipodermico di calomelano alla tempia. *Gaz. d'ospit.*, vol. viii., p. 38, May, 1887.

222. SCHIRMER. Iritis in diabetes. *Zeh. klin. Monatsbl.*, vol. xxv., p. 172.

223. SCHWEIGGER. Anterior synechia without perforation of the cornea. *Arch. f. Augenhk.*, vol. xvii., p. 403.

QUERENGHI (221) reports a case of not specific iritis with adhesions, which had been treated for three weeks with atropine and derivatives without any effect upon the condition. A subcutaneous injection of calomel at the temple (0.04 in 10 parts of glycerine) had the most surprising effect. Within twenty-four hours the atropine produced its effect, and in four days more the whole disease was over. The author recommends these injections, not only in syphilitic iritis, but also in all cases of congestion of the iris and ciliary body. DANTONE.

SCHIRMER (222) briefly reports a case of iritis in diabetes, in which only the pertinacity of the disease drew the attention to the urine, there being no other symptoms, and also mentions a case of diabetic amblyopia, in which death suddenly supervened while the patient was comatose.

XII.—GLAUCOMA.

224. MOTAIS. Traitement chirurgical du glaucome par la création d'une fistule conjonctivale. *Soc. franç. d'ophth.*, May 4, 1887.

225. SUAREZ DE MENDOZA. Oulétomie et iridectomie secondaires dans lá recidive du glaucome opéré. *Rec. d'ophth*, 1887, No. 6, p. 348.

226. VACHER. La sclérotomie équatoriale dans le glaucome. *Soc. franç. a'ophth.*, May 4, 1887.

MOTAIS (224) performs posterior sclerotomy by seizing the conjunctiva above the cornea, rotating the eye, and making a section 6-8 *mm* in extent, 4-5 *mm* behind the equator, between the superior and external recti muscles, the knife being brought forward as the section is made. A little vitreous is allowed to escape, and the forceps is removed, so that the wound, by the laxity of the conjunctiva, becomes a subconjunctival one. Fifteen patients were operated in this manner, in thirteen of whom a scleral fistula formed, so that the intraocular liquid could freely enter the pocket which formed under the conjunctiva. In these thirteen cases the patients were permanently cured, the other two not, as the opening in the sclera closed. Galezowski advises to make a small section in posterior sclerotomy, so that *no* fistula may form, which he claims leads to atrophy, while Dianoux tries to obtain just the opposite, namely, a long-continued gaping of the wound by massage (in iridectomy also). Wecker and Panas decidedly and openly assert that many cases of glaucoma are not cured by any operation, or only by enucleation.

MARCKWORT.

SUAREZ DE MENDOZA (225) advises the detachment of incarcerations of the iris, the result of an iridectomy for glaucoma, and followed by a relapse of that disease. To accomplish this he plunges the knife through the cornea, edge downward, at the point of contact between the upper corneal quadrant and the three lower quadrants, prolongs the section downward to the neighborhood of the transverse diameter of the cornea, and utilizes (after instilling eserine) the two wounds thus formed for drawing out and abcising the iris, the knife, of course, having been withdrawn. MARCKWORT.

VACHER (226) performed equatorial sclerotomy in the following manner in six obstinate cases of glaucoma: While the eye

looks downward and inward, Vacher plunges a lance-shaped knife into the sclera and deep into the globe between the superior and external recti muscles, about 8 to 10 *mm* from the corneal margin. A considerable quantity of vitreous escapes from the section, which is made about 8 *mm* long. In five of the six cases the result is said to have been very good. . MARCKWORT.

XIII.—LENS.

227. BOÉ. Recherches expérimentales pour servir à l'étude de la cataracte traumatique. II. Part. *Arch. d'ophth.*, vol. vii., No. 3, p. 193. With illustrations.

228. BURNETT, S. M. Remarks on cataract extraction. *Jour. Amer. Med. Assoc.*, April 9, 1887.

229. COLBURN, J. E. The galvanic current in the treatment of certain forms of cataract. *Ibid.*

230. LANGENHAGEN. Contributions à l'étude du traitement des cataractes non mûres. *Thèse de Nancy*, 1887.

231. MÖLLER. On the occurrence and operative treatment of cataract in dogs, with report of cases. *Zeitschr. f. vergl. Augenhk.*, 1887, p. 138.

232. SEREBRENNIKOWA, EUG. Short report on one hundred extractions performed at the hospital at Perm. *Wratsch*, Nos. 24 and 25.

233. SIMI. Sutura del lembo dopo la estrazione della cataratta. *Boll. d'ocul.*, vol. ix., 10–11, p. 79.

234. DE WECKER. De l'extraction de la capsule antérieure dans l'opération de la cataracte. *Soc. franç. d'ophth.*, May 3, 1887.

BOÉ (227) saw, while pursuing his studies on traumatic cataract, the appearance of a layer of pseudo-epithelium on the posterior capsule. This pseudo-epithelium begins posteriorly from the point where the epithelium of the anterior capsule ceases, and its nuclei are much thicker than those of the latter. On the left side of the lens it covered the inner surface of the posterior capsule, and where this was absent it lay directly upon the lens-substance. On the right side of the lens it covered the outer surface of the capsule. With the aid of illustrations prepared from microscopic specimens the author demonstrates the development of the pseudo-epithelium from the layer of cells covering the ciliary body. V. MITTELSTÄDT.

BURNETT (228) reports twenty-five extractions of senile cataract. Of these ten were without an iridectomy. Two were extracted in the capsule. There were two losses, one from hemorrhage into the eye, from vomiting, and one from suppuration. In the latter the operation was done under strict antiseptic precautions. All the cases were treated in the open wards of a general hospital. He thinks extraction without an iridectomy will become the rule in the not distant future. BURNETT.

COLBURN (229) gives the results of his treatment of incipient cataract by means of the continuous current of electricity. Three cases were not benefited. In six the benefit was decided and continued while the patients were under observation—from four to seven years. In three cases there was complete removal of short lines and nebulæ, and in two there was complete absorption of opacities. BURNETT.

LANGENHAGEN (230) recommends artificial ripening of cataract according to Böhmer. Two or three small openings are made in the capsule with a division-needle, followed by massage with the finger on the upper lid, after the aqueous has entirely escaped. Report of thirteen cases. MARCKWORT.

SEREBRENNIKOWA (232) saw in one case panophthalmitis after extraction, in two suppuration with V = o. In two cases the extraction was successful, although blennorrhœa of the lachrymal sac had been overlooked. The success in these two cases is ascribed by the author to the dusting of iodoform upon the wound, which he never omits. HIRSCHMANN.

SIMI (233) sutured the flap according to Barraquer in the case of a cataract patient, who was also suffering with entropium resulting from trachoma, and whose cornea was vascular. The wound healed rapidly, although the operation caused an immediate increase of the pannus. DANTONE.

WECKER (234) again extracts the anterior capsule with the forceps ; but as he has abandoned the iridectomy he cannot use the forceps of Förster and Colsmann, and so has returned to one he devised in 1871, the teeth of which lie nearer the end. With this instrument he claims he can extract the anterior capsule in ninety per cent. of all cases. Panas and Galezowski are opposed to the use of Wecker's forceps. MARCKWORT.

XIV.—VITREOUS.

235. MAGNUS, H. A case of visibility of Cloquet's canal. With illustration. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. XXV., p. 204.

XV.—RETINA AND FUNCTIONAL DISTURBANCES.

236. ARMAIGNAC. Amaurose hystérique monolatérale. Guérison complète et subite sans traitement. *Soc. franç. d'ophth.*, May 6, 1887.

237. DARIER. Sur la pilocarpine. *Soc. franç. d'ophth.*, May 5, 1887.

238. GOLDZIEHER. Report of cases of Hutchinson's changes at the fundus. *Wiener med. Blätter*, No. 14, 1887.

239. HIRSCHBERG, J. Leucæmic retinitis. *Centralbl. f. Augenhk.*, 1887, p. 97.

240. PONCET. Statistiques des décollements de la rétine. *Soc. franç. d'ophth.*, May 3, 1887.

241. WEBSTER, D. A case of complete detachment of the retina, with œdema and formation of serous cysts. *N. Y. Med. Jour.*, May 14, 1887.

ARMAIGNAC (236) saw an hysterical amaurosis which had lasted four years disappear suddenly without treatment, in a girl aged ten, who had already menstruated, and is inclined to ascribe the cure to the excitement in which the girl was thrown when she heard that her case was a serious one requiring the consultation of several physicians. MARCKWORT.

DARIER (237) discusses the value of pilocarpine in making the differential diagnosis betweed toxic amblyopia and gray atrophy of the optic nerve. While the subcutaneous injections have no effect upon vision in gray atrophy, there is an immediate improvement in toxic amblyopia. Though this is only temporary, repeated injections can make it permanent. On this occasion Coppez reports that he had injected 0.3 of pilocarpine without producing a toxic effect, in a patient who had received a subcutaneous dose of 0.02 of atropine by mistake. Suarez observed severe clonic cramps after an injection of 0.035 of pilocarpine. Poncet advises to inject pilocarpine very carefully in albuminuria, as it easily causes retinal hemorrhages in this disease. MARCKWORT.

GOLDZIEHER (238) reports four cases of the central retinal affections described by Hutchinson, in which the yellowish or whitish dots not surrounded with pigment are found symmetrically arranged around the macula, the centre of the latter always remaining free. There is a central scotoma of varying extent. Recovery may take place, or the condition may remain unchanged for years. It is frequently complicated with extensive hemor-

rhages into the vitreous, and Goldzieher found in all cases general atheromatous changes. Advanced age, especially in women, seems to predispose.

HIRSCHBERG (239) reports a case of leucæmic retinitis in a patient aged thirty-one, who was first treated on account of a central scotoma of one eye resulting from hemorrhage, while the ophthalmoscope already revealed numerous small hemorrhages, some of them with a bright white centre. Later a hemorrhage at the macula of the other eye also took place. The round white spots, surrounded with a broad zone of blood, accompanied with numerous small hemorrhages, gradually increased in number. At the same time the spleen began to swell, its length being 40 *cm*, its breadth 18 *cm*. The white blood corpuscles equalled the red in number. The patient had acquired syphilis thirteen years before.

PONCET (240) presents statistics of detachment of the retina, according to which this disease occurs most frequently among the rural population, a conclusion which is denied by Gorecki. Poncet is opposed to any operation whatsoever in this affection, while Galezowski and Bettremieux recommend iridectomy. Dor obtained good results with the artificial leech. Coppez performed iridectomy in eighteen cases and Wolfe's operation in seventeen, but is of the opinion that as yet no successful method of treating detachment of the retina has been devised. MARCKWORT.

WEBSTER'S (241) patient was a man sixty-six years old, highly myopic ($\frac{1}{2}$), and a sufferer from chronic bronchitis. The retina of the right eye became detached during a spell of coughing, and vision was lost. The eye was enucleated five years afterwards because of chronic inflammation. It was examined by Dr. van Gieson, who found complete detachment of the retina, capsular cataract, and partial degeneration of the lens. There were numerous small cysts between the limitans externa and external molecular layer, and two larger ones 5 *mm* in diameter.

BURNETT.

XVI.—OPTIC NERVE.

242. DEUTSCHMANN, R. On optic neuritis, especially so-called choked disc and its connection with cerebral affections. Jena, 1887. G. Fischer. 68 pp.

DEUTSCHMANN (242) endeavors to show the development of choked disc with the aid of experiments, starting from the obser-

vation that in this affection the autopsy hardly ever reveals a marked dropsy of the sheaths of the optic nerve, while the inflammatory symptoms are very marked. He was never able in the course of his experiments to produce the symptoms of well-defined choked disc by the simple injection of indifferent, *i. e.*, sterilized solutions of agar-agar colored with India ink, no matter whether he injected into the sheaths of the optic nerves or directly into the subdural space or the brain itself. After a short time the ophthalmoscopic symptoms of choked disc disappeared, such as tortuosity and dilatation of the veins. When, however, he injected septic substances, for instace, weak emulsions of staphylococcus or tubercle bacilli, he always obtained the distinct picture of choked disc, though increased pressure in the cranial cavity or compression of the optic nerve was out of the question in this instance ; the affection of papilla must have been the result of an inflammatory process. Deutschmann therefore believes that in man also choked disc, as we see it, for instance, so frequently in intracranial tumors, does not depend upon the intracranial pressure, but upon the presence of a specific virus, for which, perhaps, there is a predisposition in these cerebral affections, and which spreads to the optic nerves. He then sifts the literature of the subject from this point of view, with the intention of ascertaining the correctness or falseness of this theory.

XVII.—INJURIES (FOREIGN BODIES) AND PARASITES.

243. Bournonville, E. Case of extraction of a piece of gun-cap. *Centralbl. f. Augenhk.*, 1887, p. 136.

244. Debierre. Corps étranger de l'œil expulsé spontanément. *Soc. franç. d'ophth.*, May 6, 1887.

245. Franke, E. Supplementary remarks to the report of cases of rents in the sphincter of the iris. *v. Graefe's Arch. f. Ophth.*, vol. xxxiii., 1, p. 245.

246. Pfalz, G. Cases of injury. *Zeh. klin. Monatsbl.*, vol. xxv., p. 233.

247. Scimeni. Sull' azione dei corpi estranei nell' occhio. *Riv. internaz.*, vol. iv., 1, p. 10.

248. Tornatoli. Due casi di cisticerco sottocongiuntivale. *Giorn. internaz. di scienz. med.*, vol. ix., 5, p. 398.

Bournonville (243) describes the successful extraction of a piece of gun-cap from the vitreous with forceps through a meridi-

onal incision through the sclera, the media being already quite cloudy. A year later the result was still comparatively good.

DEBIERRE (244) reports the case of a child eight years old, into whose eye a foreign body (a piece of cartridge) had entered through the sclera about 1 *mm* from the upper outer corneal margin. Two days after the injury Meyer introduced a probe, but could not find the foreign body. Fifteen months afterwards a black spot was observed at the point of injury, which felt hard when touched with the probe. It proved to be the foreign body, and was easily removed. MARCKWORT.

PFALZ (246) saw an air-bubble enter the vitreous after a piece of steel which had penetrated the upper lid, the globe, and the lens in its equatorial portion. It simulated at first the presence of the foreign body behind the lens, while the piece of steel was found near the papilla in the posterior part of the vitreous. It was extracted with a magnet and $V = \frac{20}{100}$ obtained. The foreign body was 3 *mm* long and 2 *mm* wide.

According to SCIMENI'S (247) experiments, foreign bodies, when aseptically introduced into the eye, cause no irritation ; some, however, like copper, produce an inflammation by their chemical action. A purulent inflammation is always due to micro-organisms which enter with the foreign body. DANTONE.

FRANKE (245) adds abstracts of three older observations of Vermyne and Gallenga to his former paper (*cfr.* Rev., No. 696, 1886, Ger. Ed.) on rents in the sphincter of the iris, with two more of his own, so that he begins to doubt the "great rarity" of this affection, an observation with which every one who has seen many cases of injury to the eye will agree.

PFALZ (246) also reports a case of rents in the sphincter of the iris after contusion of the globe, in which the rents were found at the edge of the iris opposite the point where the blow was received, while at the same time the tissue at the posterior part of the globe was probably torn. The relaxation of the coats of the eye thereby produced led to the development of a myopia of 2 D in the course of the next week.

TORNATOLI (248) reports on two cysticerci, the size of a pea, which were removed by Tartuferi from the ocular conjunctiva, and describes their histological structure. DANTONE.

XVIII.—OCULAR AFFECTIONS IN CONSTITUTIONAL DISEASES.

249. ALEXANDER. Circumscribed softening in the right pedunculus cerebri. *Deutsche med. Wochenschr.*, 1887.

250. ARMAIGNAC. Amaurose hystérique monolatérale. *Cfr.* Rev., No. 236.

251. BOUCHERON. Cyclitis minima rhumatismale ou goutteuse. *Soc. franç. d'ophth.*, May 2, 1887.

252. BRUNS, H. D. Amblyopia following sudden discontinuance of accustomed alcoholic stimulants. *N. Y. Med. Jour.*, 1887.

253. CHEATHAM, W. Nasal reflexes as a cause of diseases of the eye. *Amer. Practitioner and News*, 1887.

254. FARAVELLI. Fenòmeni oculari riflessi da tænia solium. *Ann. di ottalm.*, vol. xvi., 1, p. 63.

255. GAILLARD. Contribution à l' étude de la phlébite des veines ophthalmiques. *Thèse de Paris*, 1887. Phlebitis of the ophthalmic veins due to a furuncle of the nose ; death.

256. KUBLI. Four cases of erythropsia. *Wjestnik ophth.*, vol. iv., No. 3.

257. MAGNUS, H. Z. Cases of irritation of the sympathetic nerve. *Zeh. klin. Monatsbl.*, vol. xxv., p. 207.

258. PECHDO. Enucléation d'un globe oculaire amenant la guérison de l'épilepsie. *Rec. d'ophth.*, 1886, No. 6, p. 346.

259. RAMPOLDI. Un caso di ambliopia saturnina. *Ann. di ottalm.*, vol. xvi., 1, p. 54.

260. ROLLAND. Les troubles de la vision dans le diabète sucré sont-ils des phenomènes de consomption ?

261. SCHIRMER. Iritis in diabetes. *Zeh. klin. Monatsbl.*, vol. xxv., p. 172. (*Cfr.* Rev., No. 222.)

262. STEVENS, G. T. Irritations arising from the visual apparatus, considered as elements in the genesis of neuroses. *N. Y. Med. Journ.*, April 16, 1887.

263. ZIEM. Visual disturbances after the application of the galvano-cautery in the nose. *Centralbl. f. Augenhk.*, vol. xi., p. 131.

ALEXANDER (249) reports the clinical history and post-mortem condition of a patient aged forty-six, who twenty years previously had acquired syphilis, and who was suffering with a tumor in the right pedunculus cerebri. This tumor caused a paralysis of the outer branches of the oculomotor nerve of the same and paresis and paræsthesia of the extremities of the other side, followed subsequently by total paralysis of the inner branches also of the

oculomotor nerve, without however affecting sight, and without any ophthalmoscopic changes. Death was caused by bronchopneumonia.

In BRUNS' (252) case the man had been drinking heavily and suddenly stopped. V. was at once reduced to fingers at four feet. The ophthalmoscope showed the papilla dim in outline in the right, normal in the left. In six days, under hypodermic injections of strychnine, V. $\frac{20}{20}$. BURNETT.

PECHDO (258) saw a patient recover from epilepsy after an enucleation. At the age of twelve he was struck on the right orbit with a stone; sight diminished, and eleven years afterwards suddenly failed entirely. Soon after he complained of pain in the right side of the head, which lasted for twenty-four hours and returned at irregular intervals. At the age of twenty-six the patient was attacked with epileptic fits, which were preceded by phosphenes. These attacks took place about once every two months; after they had lasted for four years, the left eye became affected with serous iritis, which frequently returned until the right was enucleated. This operation was done in April, 1883, and since that time no epileptic attacks have been observed to date (February, 1887). The retina was found detached in the enucleated eye, and the lens appeared ossified. MARCKWORT.

CHEATHAM (253) records three cases where asthenopia has persisted after correction of all refractive and muscular troubles, in which relief was obtained by treating the diseased nasal conditions, polypi, septum deflections, etc. BURNETT.

FARAVELLI'S (254) patient had observed phosphenes two or three times every night in his right eye for a week, which were followed after a few minutes by a dimness of sight also lasting but a short time. After a pause of three months the attacks returned with much greater intensity. After seeing the little flames, vision in the right eye was lost almost entirely, and that of the left also became dim. The phenomenon now occurred daily, lasted five minutes, and then normal vision was restored. The ophthalmoscope revealed anæmia of the central retinal artery, engorgement of the veins, and in the right eye pulsation of the latter. V in both $\frac{20}{20}$. In searching for the cause of these remarkable phenomena, Faravelli found the eggs and parts of tænia solium in the dejections. The patient remained free from the attacks for two months, after a large number of pieces had come away, and recovered completely when after a relapse the head of the tapeworm was removed. DANTONE.

KUBLI (256) reports four cases of erythropsia: 1. that of a lady aged 78. Extraction was performed on the right eye in May, 1884, with a broad iridectomy downward, V = 0.3. In the left, incipient cataract, with fairly good sight. The patient uses the eye which has not been operated upon. In February, 1885, after reading for a long time, a first attack of erythropsia in the aphakial eye, lasting several days. A second attack in March, 1886, after the patient had been exposed to strong sunlight. Color-perception good, but all colors seem paler to the operated eye. 2. A healthy woman, thirty-three years old, in ninth month of pregnancy. Sees every thing red, after a strict fast lasting some time. Emmetropia; V = $\frac{20}{20}$. Color-perception normal, but all colors seem paler. 3. Woman, thirty-three years old, in ninth month of pregnancy, suffering for two months after a long and strict fast with hemeralopia; intense erythropsia for three days. Emm.; V = 0.9. Color-perception normal; perception of light diminished. 4. Woman, thirty-four years old, suffering for three weeks with hemeralopia after a strict fast; complains of erythropsia under artificial illumination. H = 1D. V = $\frac{20}{30}$. Color-perception normal, perception of light much reduced. Three days after the end of the fast the patient had recovered. The connection in cases 3 and 4 of the erythropsia with the hemeralopia, a purely retinal affection, seems to indicate, in the author's opinion, a retinal origin of the erythropsia in these cases at least.

HIRSCHMANN.

MAGNUS (257) observed sympathetic irritation of the right side of the face in a woman aged fifty-one, suffering with supra-orbital neuralgia of the left side; it was noticed after the slightest irritation, and manifested itself by excessive perspiration, redness of the face, and dilatation of the pupil, while the palpebral fissure was not wider, nor was there exophthalmus. The right thyroid gland was somewhat enlarged. Function of the heart normal. The eleven-year-old son of the patient also showed symptoms of temporary irritation of the sympathetic nerve, the pupil enlarging and contracting spasmodically.

RAMPOLDI (259) found that in a lady whose sight had been diminishing for two years, and who frequently suffered with megrim, sleeplessness, a sense of fear, and slight intestinal affections, the cause of all the troubles could be traced to a hair-wash, containing as its principal ingredient about 3 % of acetate of lead. V in the right eye $\frac{1}{4}$, in the left $\frac{1}{2}$; pupil reacts slowly; F complete. The ophthalmoscope revealed peculiar finely granular opacities of

the vitreous and contracted retinal arteries. The patient completely recovered in a month after leaving off the hair-wash and taking iodide of potassium. DANTONE.

ROLLAND (260) discusses in an interesting paper the diabetic affections of the eye, and reports a case of diabetic complete paralysis of the oculomotor nerve of the right eye with slight opacity of the lens. The patient recovered in a month and a half after being put under antidiabetic treatment and receiving injections of strychnine at the temple. MARCKWORT.

The theme of STEVENS' (262) paper, as stated by himself, is that "difficulties attending the functions of accommodating and of adjusting the eyes in the act of vision, or irritations arising from the nerves involved in these processes, are among the most prolific sources of nervous disturbances and more frequently than any other conditions constitute a neuropathic tendency." In support of this proposition he relates cases of epilepsy, chorea, neuralgia and insanity, which had been cured or relieved by tenotomy of one of the ocular muscles when insufficiency had been demonstrated. A full exposition of his methods is to be found in a series of papers in course of publication in these ARCHIVES, vol. xvi., p. 149, June, 1887. BURNETT.

ZIEM (263), who is also a specialist for diseases of the nose and ear, has been induced to give up the galvano-caustic treatment of the nasal mucous membrane several years ago, on account of the visual disturbances caused thereby. He saw not only severe congestion of the ciliary body, but also of the retina and optic nerve (venous pulse), follow such treatment, causing accommodative disturbances and periodic obscurations of the sight. He obtained many good results by drawing blood from the nose with the galvano-cautery, by applying it to the nasal mucous membrane and then suddenly tearing it away.

MISCELLANEOUS NEWS.

Mr. H. R. Swanzy, of Dublin, has been invited to deliver the "Bowman" lecture before the Ophthalmological Society of the United Kingdom, on November 11, 1888.

Provisional program of the Seventh Periodical **International Ophthalmological Congress,** to be held at Heidelberg, from the 9th to the 12th of August, 1888 :

On the opening day, August 8th, and on August 9th until 9 o'clock A.M., inscription of members and visitors.

Thursday, 9th of August.—1. Meeting at 9 A.M. Reception of members and visitors by a member of the committee. Election of President, Secretary, and other officers. Report on "Glaucoma." Reporter : Mr. Priestley Smith (Birmingham). Second reporter : Mr. Snellen (Utrecht). Discussion. 2. Meeting at 3 P. M. Lectures and Papers, of which previous notice has been given.

Friday, 10th of August.—3. Meeting at 9 A.M. Report on "Cataract." Reporter : Mr. Gayet (Lyon). Second reporter : Mr. Schweigger (Berlin). Discussion. Lectures and Papers, of which notice has been given. 4. Meeting at 3 P.M. Lectures and Papers, after previous notice.

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Dr. CORNELIUS REA AGNEW

died April 18, 1888, after a short illness (of perityphlitis). He was born in New York City August 9, 1830. On his father's side he was of Scotch-Irish Huguenot ancestry. He received his early education in a private school, entered Columbia College in 1845, and was graduated in 1849. He studied medicine in the College of Physicians and Surgeons, of New York, where he was graduated in 1852. After visiting different renowned medical schools in Europe, he settled in New York as a general practitioner in 1855, and became one of the Surgeons of the New York Eye and Ear Infirmary. He held this position until 1864, when his duties on the U. S. Sanitary Commission, of which he was one of the promoters, compelled him to resign. He did excellent service during the war. He was a public-spirited citizen, an enthusiastic and generous supporter of many charitable and scientific enterprizes, a forcible speaker, a fluent lecturer, an eminently practical and instructive clinical teacher, a refined and hospitable gentleman, a warm-hearted friend, an uncompromising opponent in questions of principle, an active and orthodox Presbyterian, without being intolerant.

His scientific importance must be judged more by his actions and his example than by his literary work. His writings have not been numerous, but they are all instructive. In 1866 he established, on the solicitation of the Faculty, an ophthalmic clinic in the College of Physicians and Surgeons of New York, and in 1867 he was appointed professor of diseases of the eye and ear in the same college, a position which he honorably held until his death. In 1868 he was one of the founders, and for a short time an attending surgeon, of the Brooklyn Eye and Ear Hospital. In 1869 he was the chief originator of the Manhattan Eye and Ear Hospital, which, by his energy, his untiring labor, and unexcelled services, has developed into one of the largest and best-appointed institutions of its kind in America. All his

professional work, both private and public, was distinguished by a spirit of caution, neatness, and deliberation. He was one of the most adroit surgeons. The writer of these lines, who often had the privilege of witnessing him at his work, never saw him do a clumsy operation.

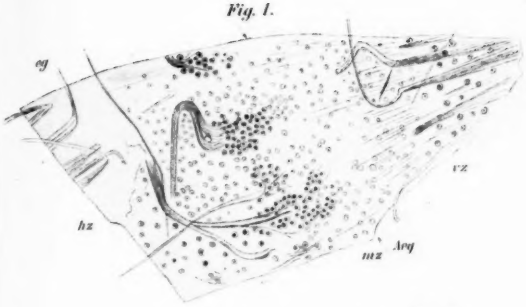
Dr. Agnew led a life of exemplary regularity, conscious that at any moment he might be called upon to assume responsible duties, for which he always not only was prepared but at his best.

He has educated numerous pupils, who, by his advice and recommendations, readily found desirable positions all over the United States. His clinics at the College of Physicians and Surgeons have been very popular, and formed one of the attractions of this celebrated, old, but steadily progressive institution.

His monument, however, will be the Manhattan Eye and Ear Hospital, where his spirit will live in the works of his associates and followers, and his memory in the hearts of thousands of patients. Only a few mortals leave such footprints of their earthly career as Dr. C. R. Agnew.

H. KNAPP.

Fig. 1.



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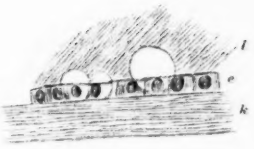

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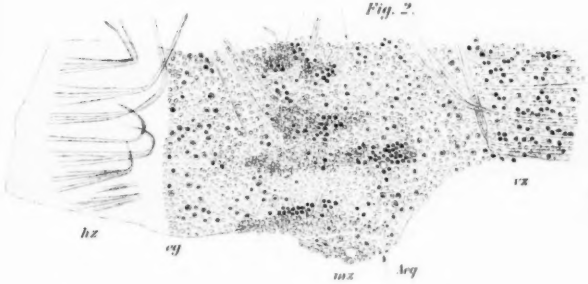

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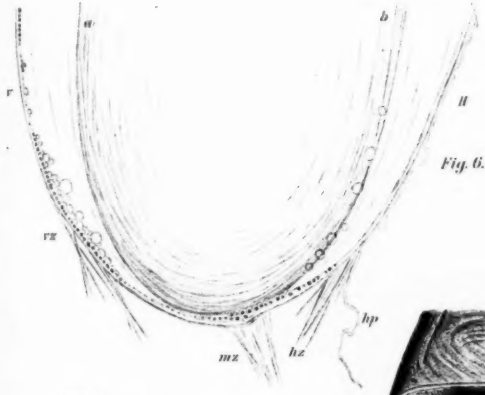

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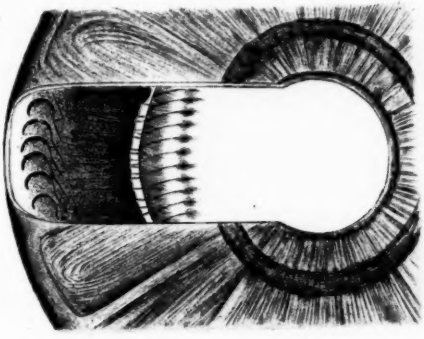

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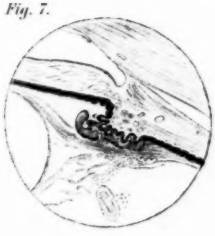

Verlag v. Pergamon, Wiesbaden.

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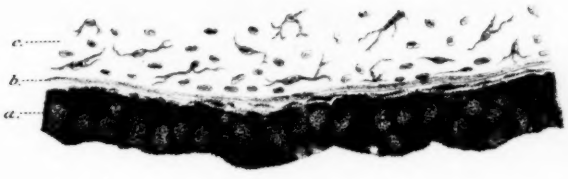

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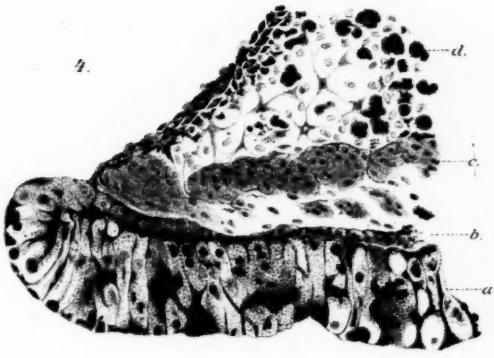

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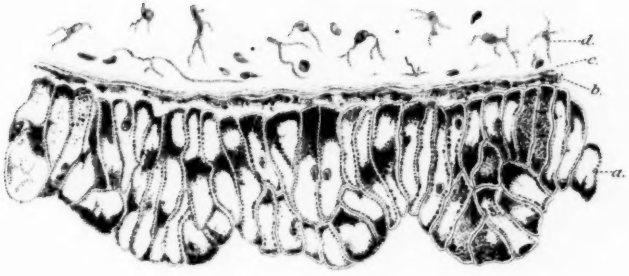

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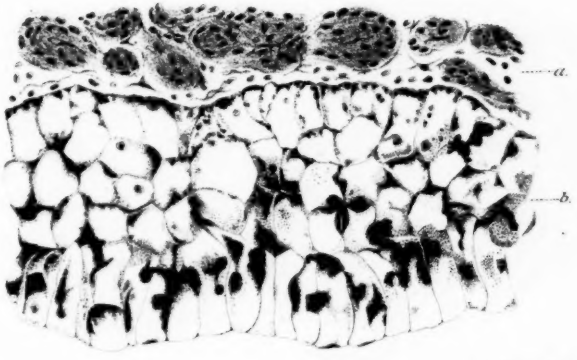

PARALYSIS OF THE OCULOMOTOR NERVE ON THE RIGHT AND OF THE ADUCENS ON THE LEFT SIDE.

By Dr. O. BULL, Christiania.

H. P. S., thirty years, employed at a place of entertainment in this town, called on me July 12, 1882. Three years previously he had a chancre, but he does not believe that this was followed by constitutional syphilis. He is now suffering from paralysis of the *right* oculomotorius ; pupil dilated. Opthalmoscopically nothing abnormal. He was ordered to take a solution of potassii-iodidum. 17th. The paralysis of oculomot. less marked. 20th. Symptoms of incipient paralysis of the *left* abducens. The eye could not be turned further outwards than that the corneal margin was 2 or 3 *mm* from canthus externus. Endeavors to turn it farther out produced oscillatory movements of the globe. 22d. The paralysis of the left abducens now more pronounced ; the eye could be turned out beyond the median line without oscillations. He still takes potassium iodide. The patient did not reappear before May 5th. The paralysis both of the right oculomot. and of the left abd. had then almost disappeared. There was, however, still some ptosis on the right side. He was told to call again, but did not come.

Most probably the paralysis of the ocular muscles in this case has been of syphilitic origin.[1] To the patient's statement that he did not believe he ever had constitutional syphilis, no great weight can be attached, so much the less as he gave me the impression of being an unreliable and

[1] A case of incomplete bilateral paralysis of oculomot. and abd. in a syphilitic individual is referred to by Mooren, Fünf Lustren Ophthalmologisches-Wirksamkeit Wiesbaden, 1882, p. 272.

oculomotor nerve, without however affecting sight, and without any ophthalmoscopic changes. Death was caused by bronchopneumonia.

In BRUNS' (252) case the man had been drinking heavily and suddenly stopped. V. was at once reduced to fingers at four feet. The ophthalmoscope showed the papilla dim in outline in the right, normal in the left. In six days, under hypodermic injections of strychnine, V. $\frac{20}{20}$. BURNETT.

PECHDO (258) saw a patient recover from epilepsy after an enucleation. At the age of twelve he was struck on the right orbit with a stone; sight diminished, and eleven years afterwards suddenly failed entirely. Soon after he complained of pain in the right side of the head, which lasted for twenty-four hours and returned at irregular intervals. At the age of twenty-six the patient was attacked with epileptic fits, which were preceded by phosphenes. These attacks took place about once every two months; after they had lasted for four years, the left eye became affected with serous iritis, which frequently returned until the right was enucleated. This operation was done in April, 1883, and since that time no epileptic attacks have been observed to date (February, 1887). The retina was found detached in the enucleated eye, and the lens appeared ossified. MARCKWORT.

CHEATHAM (253) records three cases where asthenopia has persisted after correction of all refractive and muscular troubles, in which relief was obtained by treating the diseased nasal conditions, polypi, septum deflections, etc. BURNETT.

FARAVELLI'S (254) patient had observed phosphenes two or three times every night in his right eye for a week, which were followed after a few minutes by a dimness of sight also lasting but a short time. After a pause of three months the attacks returned with much greater intensity. After seeing the little flames, vision in the right eye was lost almost entirely, and that of the left also became dim. The phenomenon now occurred daily, lasted five minutes, and then normal vision was restored. The ophthalmoscope revealed anæmia of the central retinal artery, engorgement of the veins, and in the right eye pulsation of the latter. V in both $\frac{20}{20}$. In searching for the cause of these remarkable phenomena, Faravelli found the eggs and parts of tænia solium in the dejections. The patient remained free from the attacks for two months, after a large number of pieces had come away, and recovered completely when after a relapse the head of the tapeworm was removed. DANTONE.

KUBLI (256) reports four cases of erythropsia: 1. that of a lady aged 78. Extraction was performed on the right eye in May, 1884, with a broad iridectomy downward, V = 0.3. In the left, incipient cataract, with fairly good sight. The patient uses the eye which has not been operated upon. In February, 1885, after reading for a long time, a first attack of erythropsia in the aphakial eye, lasting several days. A second attack in March, 1886, after the patient had been exposed to strong sunlight. Color-perception good, but all colors seem paler to the operated eye. 2. A healthy woman, thirty-three years old, in ninth month of pregnancy. Sees every thing red, after a strict fast lasting some time. Emmetropia; V = $\frac{20}{20}$. Color-perception normal, but all colors seem paler. 3. Woman, thirty-three years old, in ninth month of pregnancy, suffering for two months after a long and strict fast with hemeralopia; intense erythropsia for three days. Emm.; V = 0.9. Color-perception normal; perception of light diminished. 4. Woman, thirty-four years old, suffering for three weeks with hemeralopia after a strict fast; complains of erythropsia under artificial illumination. H = 1D. V = $\frac{20}{30}$. Color-perception normal, perception of light much reduced. Three days after the end of the fast the patient had recovered. The connection in cases 3 and 4 of the erythropsia with the hemeralopia, a purely retinal affection, seems to indicate, in the author's opinion, a retinal origin of the erythropsia in these cases at least.

HIRSCHMANN.

MAGNUS (257) observed sympathetic irritation of the right side of the face in a woman aged fifty-one, suffering with supra-orbital neuralgia of the left side; it was noticed after the slightest irritation, and manifested itself by excessive perspiration, redness of the face, and dilatation of the pupil, while the palpebral fissure was not wider, nor was there exophthalmus. The right thyroid gland was somewhat enlarged. Function of the heart normal. The eleven-year-old son of the patient also showed symptoms of temporary irritation of the sympathetic nerve, the pupil enlarging and contracting spasmodically.

RAMPOLDI (259) found that in a lady whose sight had been diminishing for two years, and who frequently suffered with megrim, sleeplessness, a sense of fear, and slight intestinal affections, the cause of all the troubles could be traced to a hair-wash, containing as its principal ingredient about 3 % of acetate of lead. V in the right eye $\frac{1}{4}$, in the left $\frac{1}{2}$; pupil reacts slowly; F complete. The ophthalmoscope revealed peculiar finely granular opacities of

the vitreous and contracted retinal arteries. The patient completely recovered in a month after leaving off the hair-wash and taking iodide of potassium. DANTONE.

ROLLAND (260) discusses in an interesting paper the diabetic affections of the eye, and reports a case of diabetic complete paralysis of the oculomotor nerve of the right eye with slight opacity of the lens. The patient recovered in a month and a half after being put under antidiabetic treatment and receiving injections of strychnine at the temple. MARCKWORT.

The theme of STEVENS' (262) paper, as stated by himself, is that "difficulties attending the functions of accommodating and of adjusting the eyes in the act of vision, or irritations arising from the nerves involved in these processes, are among the most prolific sources of nervous disturbances and more frequently than any other conditions constitute a neuropathic tendency." In support of this proposition he relates cases of epilepsy, chorea, neuralgia and insanity, which had been cured or relieved by tenotomy of one of the ocular muscles when insufficiency had been demonstrated. A full exposition of his methods is to be found in a series of papers in course of publication in these ARCHIVES, vol. xvi., p. 149, June, 1887. BURNETT.

ZIEM (263), who is also a specialist for diseases of the nose and ear, has been induced to give up the galvano-caustic treatment of the nasal mucous membrane several years ago, on account of the visual disturbances caused thereby. He saw not only severe congestion of the ciliary body, but also of the retina and optic nerve (venous pulse), follow such treatment, causing accommodative disturbances and periodic obscurations of the sight. He obtained many good results by drawing blood from the nose with the galvano-cautery, by applying it to the nasal mucous membrane and then suddenly tearing it away.

MISCELLANEOUS NEWS.

Mr. H. R. SWANZY, of Dublin, has been invited to deliver the "Bowman" lecture before the Ophthalmological Society of the United Kingdom, on November 11, 1888.

Provisional program of the Seventh Periodical **International Ophthalmological Congress,** to be held at Heidelberg, from the 9th to the 12th of August, 1888 :

On the opening day, August 8th, and on August 9th until 9 o'clock A.M., inscription of members and visitors.

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H. KNAPP.